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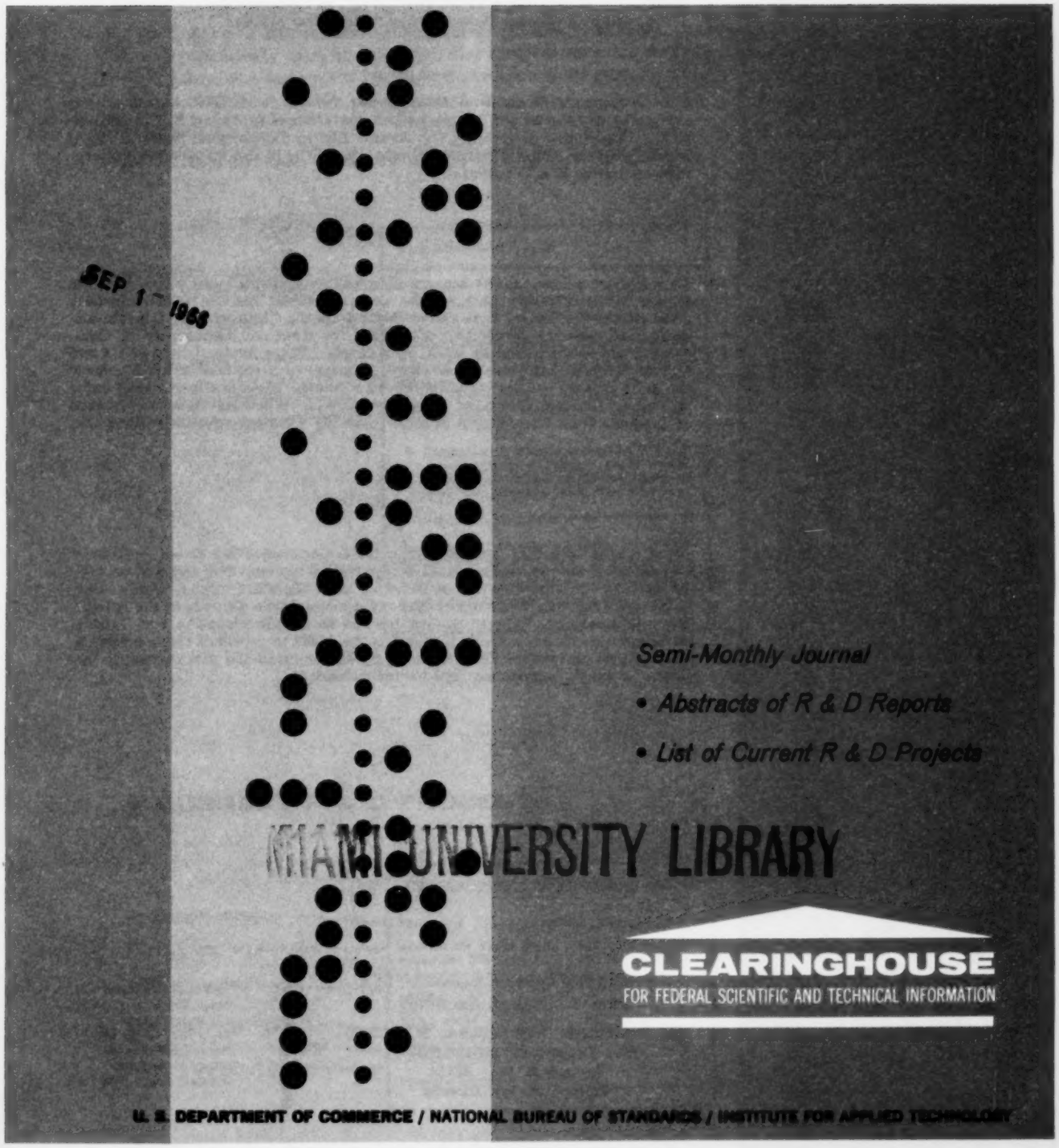
July 25, 1966

U.S. GOVERNMENT

RESEARCH & DEVELOPMENT REPORTS



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Semi-Monthly Journal

- Abstracts of R & D Reports
- List of Current R & D Projects

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U. S. DEPARTMENT OF COMMERCE / NATIONAL BUREAU OF STANDARDS / INSTITUTE FOR APPLIED TECHNOLOGY

July 25, 1966 / Volume 41, Number 14

U.S. Government

RESEARCH AND DEVELOPMENT REPORTS

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PURPOSE

U.S. Government Research & Development Reports (USGRDR) announces the availability of selected new reports of U.S. Government-sponsored R & D released by the Department of Defense, the Atomic Energy Commission, National Aeronautics & Space Administration, and other agencies. It also lists current Government-sponsored R & D projects.

TO ORDER REPORTS

With few exceptions, reports announced herein are available to the public from the Clearinghouse. Order reports by the accession/report number (stock number) given on the first line of each entry. Order from the Clearinghouse, U.S. Department of Commerce, Springfield, Va. 22151, or from any Department of Commerce Field Office (listed on inside back cover). Prices for hard copy (HC) and microfiche (MF) are given in the entry. Prepayment is required unless purchases are to be charged to Clearinghouse deposit accounts. Make check or money order payable to National Bureau of Standards—CFSTI. When reports are announced as available from an organization other than the Clearinghouse, order from that source.

INDEX

All entries in USGRDR are indexed in the *Government-Wide Index to Federal Research & Development Reports (GWI)* published semi-monthly and sold on subscription by the Clearinghouse at $22.00 a year ($27.50 foreign). Single copy $1.75. Indexing data from recent issues of announcement journals of the Atomic Energy Commission, National Aeronautics and Space Administration, and Defense Documentation Center are also included in this index to provide a single reference guide to new unclassified Government-sponsored research and development in the physical sciences, engineering, and related technology.

U.S. DEPARTMENT OF COMMERCE
John T. Connor, Secretary

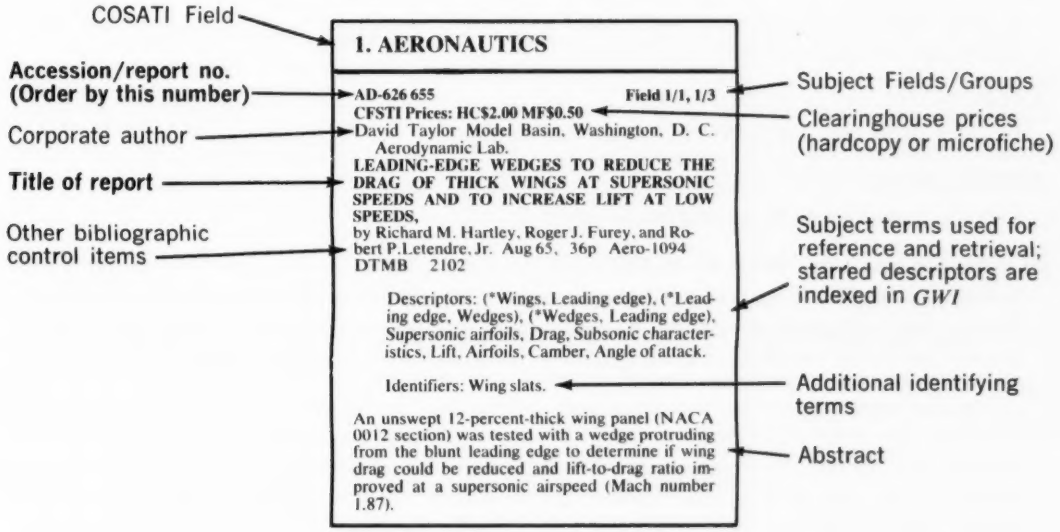
CLEARINGHOUSE FOR FEDERAL SCIENTIFIC
AND TECHNICAL INFORMATION
Springfield, Va. 22151
Bernard M. Fry, Director

Contents may be printed freely. Mention of source will be appreciated.
Use of funds for this publication approved by the Director of the Bureau of Budget, June 22, 1966.

USGRDR FORMAT

Entries are arranged under 22 subject categories called FIELDS. In the entry, subcategories called GROUPS and occasionally sub-groupings are also indicated. This system was adopted by the Committee on Scientific and Technical Information (COSATI) of the Federal Council on Science and Technology. The COSATI Subject Category List, AD 612 200, is available from the Clearinghouse at $1.00. Documents are listed alphanumerically (that is, alphabetic data precedes numerical data) by accession/report number. Key segments of information contained in the entries are identified diagrammatically below.

● RESEARCH & DEVELOPMENT REPORTS


COSATI Field
Accession/report no. (Order by this number)
Corporate author
Title of report
Other bibliographic control items
1. AERONAUTICS
AD-626 655
Field 1/1, 1/3
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamic Lab.
LEADING-EDGE WEDGES TO REDUCE THE DRAG OF THICK WINGS AT SUPERSONIC SPEEDS AND TO INCREASE LIFT AT LOW SPEEDS,
by Richard M. Hartley, Roger J. Furey, and Robert P. Letendre, Jr. Aug 65, 36p Aero-1094 DTMB 2102
Descriptors: (*Wings, Leading edge), (*Leading edge, Wedges), (*Wedges, Leading edge), Supersonic airfoils, Drag, Subsonic characteristics, Lift, Airfoils, Camber, Angle of attack.
Identifiers: Wing slats.
An unswept 12-percent-thick wing panel (NACA 0012 section) was tested with a wedge protruding from the blunt leading edge to determine if wing drag could be reduced and lift-to-drag ratio improved at a supersonic airspeed (Mach number 1.87).
Subject Fields/Groups
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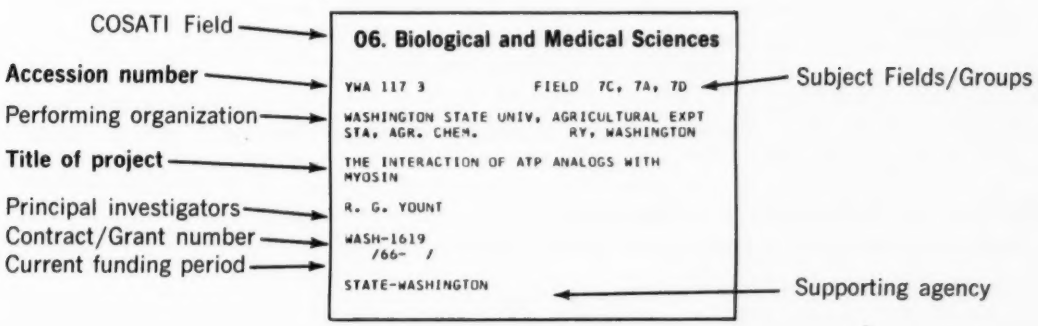
Subject terms used for reference and retrieval; starred descriptors are indexed in GWI
Additional identifying terms
Abstract

● CURRENT R & D PROJECTS



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Includes aerodynamics; aeronautics; aircraft; aircraft flight control and instrumentation; and air facilities.

02 AGRICULTURE 4
Includes agricultural chemistry; agricultural economics; agricultural engineering; agronomy and horticulture; animal husbandry; and forestry.

03 ASTRONOMY AND ASTROPHYSICS 5
Includes astronomy; astrophysics; and celestial mechanics.

04 ATMOSPHERIC SCIENCES 6
Includes atmospheric physics and meteorology.

05 BEHAVIORAL AND SOCIAL SCIENCES 9
Includes administration and management; documentation and information technology; economics; history, law and political science; human factors engineering; humanities; linguistics; man-machine relations; personnel selection, training, and evaluation; psychology (individual and group behavior); and sociology.

06 BIOLOGICAL AND MEDICAL SCIENCES 25
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Includes chemical engineering; inorganic chemistry; organic chemistry; physical chemistry; and radio and radiation chemistry.

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Includes adhesives and seals; ceramics, refractories, and glasses; coatings, colorants, and finishes; composite materials; fibers and textiles; metallurgy and metallography; miscellaneous materials; oils, lubricants, and hydraulic fluids; plastics; rubbers; solvents, cleaners, and abrasives; and wood and paper products.

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Includes air conditioning, heating, lighting, and ventilating; civil engineering; construction equipment, materials, and supplies; containers and packaging; couplings, fittings, fasteners, and joints; ground transportation equipment; hydraulic and pneumatic equipment; industrial processes; machinery and tools; marine engineering; pumps, filters, pipes, tubing, fittings, and valves; safety engineering; and structural engineering.

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Biological and Medical Sciences

ARGONNE PAPERS REPORT ON CANCER RESEARCH

(Order Stock No. ACRH-24 Semiannual Report to the Atomic Energy Commission, HC $5.00/MF $1.00.)

Argonne Cancer Research Hospital's semiannual report to the sponsoring AEC contains nineteen papers on such studies as the erythropoietic effect of plasma from mice receiving testosterone; the erythropoietic effect of androgens; the effect of estradiol on bone marrow transplantation in lethally irradiated mice; increased iron absorption during liver regeneration induced by partial hepatectomy; and the role of calcium in complement dependent hemolysis. Other work includes the mechanism of tolerance produced in rats to sheep erythrocytes (plaque-forming cells and antibody response to single and multiple injections of antigen and to multiple injections begun at birth); alkaptonuria and ochronic arthropathy; anabolic hormones in hyperparathyroidism; the enzymatic synthesis of ribonucleic acid (the interaction of RNA polymerase with nucleic acids); and pseudouridylic kinase activity in escherichia coli.

AEC REPORTS PROGRESS IN BIOMED R AND D PROGRAMS

(Order Stock No. TID-4204 Research and Development in Progress - Biology and Medicine, HC $5.50/MF $2.25.)

The Atomic Energy Commission's Biological, Medical and Environmental Research Program's latest publication on its individual projects lists summaries furnished by its investigators to the Science Information Exchange of the Smithsonian Institution. The publication gives a mass of information on basic research and areas of specialized problems of health and safety. Other projects are aimed at the discovery and promotion of beneficial uses of special nuclear and radioactive materials and accelerator radiations in the treatment of cancer, and the discovery and promotion of unique uses of these nuclear materials and radiations for practical medical, biological, agricultural, and food-processing applications. The publication has 305 pages summarizing the projects and a 222-page index.

REDUCTION IN BLOOD LIPID PARAMETERS AND HEART DISEASE

(Order Stock No. UCRL-14658 Ischemic Heart Disease, Atherosclerosis, and Longevity, HC $2.00/MF $0.50.)

A 10-year study of employees of the Lawrence Radiation Laboratory indicates that if moderate reduction in blood lipid parameters does prove to alter the risk of de novo ischemic heart disease in ostensibly healthy subjects of young age groups (well below 55 years of age), the effect will be lost when the subjects reach 55 years of age, even if the regimen prescribed is adhered to faithfully. In essence this is a statement that the life expectancy at 55 years of age and beyond will not be materially altered, so far as coronary disease is concerned, by moderate reductions in blood lipid levels within the range of values characteristic of the U. S. population at present. However, if longevity as limited by coronary atherosclerosis is to be altered through effects upon blood lipid parameters, a drastic rather than moderate reduction in such parameters is required.

These are but a few of the many findings contained in an LRL study that notes an early premise was that persons manifesting overt clinical ischemic heart disease at a given point in life must have been developing stenotic coronary artery disease at a greater rate than cohorts not manifesting clinical disease at that same point in life. "Ideally," says LRL, "such information must be sought in a prospective study, that is, one in which the cases of clinically overt heart disease arise out of an ostensibly healthy substrate population sample." A study of this type had been initiated by the U. S. Public Health Service at Framingham, Mass., including serum cholesterol measurement. In 1950, with the Donner Laboratory participating, studies of the serum low-density lipoproteins were added to the Framingham program. In 1953 a similar study, including serum cholesterol, low-density lipoproteins, and high-density lipoproteins was initiated in industrial employees of LRL. The results of 12 years of follow-up in the Framingham study and 10 years in the Livermore study are given in the LRL report.

LURIA'S LECTURES ON SPEECH AND THE ABNORMAL CHILD REPRINTED

(Order Stock No. TT-66-60821 The Role of Speech in the Regulation of Normal and Abnormal Behavior, HC $4.00/MF $0.75.)

The out-of-print lectures of Moscow University's A. R. Luria on the role of speech in the regulation of normal and abnormal behavior have been reprinted by the Clearinghouse. Originally translated for the National Institutes of Health in 1960, the lectures are headed: (1) The Role of Speech in the Formation of Mental Processes; (2) The Development of the Regulatory Role of Speech in the Child; and (3) Modifications in the Regulatory Role of Speech Resulting From Pathological States of the Brain. In addition, a paper presented at the Seminar on the Mental Health of the Subnormal Child held at Milan in May 1959 is included. ("Experimental Study of the Higher Nervous Activity of the Abnormal Child.") Much of the writings are devoted to oligophrenia, a profound mental underdevelopment which results from a massive cerebral lesion experienced in the intrauterine period or in early childhood, and leading to a severe disturbance of the subsequent mental development of the child. Referring to his study of such lesions and their effect on speech, Dr. Luria says, "It is quite clear that our experimental research is of double benefit; firstly it actually helps us to mark out the principal features of the physiology of the higher nervous activity in oligophrenic children; secondly, having disclosed the basic mechanisms of these disturbances, it enables us to facilitate the differential diagnosis of oligophrenia and the cerebroasthenic syndrome, which in children often presents considerable difficulties." (Bibliography of 36 references from the Soviet Union literature appended).

Chemical Processing

NEW VALVE CONTROLS FLOW OF GRANULAR SOLIDS

(Order Stock No. IDO-14666 A Flow Diverter Valve for Granular Solids, HC $1.00/MF $0.50.)

A pneumatically operated device for controlling the rate and direction of flow of granular solids has been developed and tested for use at Phillips Petroleum's Idaho Chemical Processing Plant. The flow diverter operates without mechanical apparatus and depends on the angle of repose of the granular solids for its operating principle. The rate of flow of a small air stream injected into the diverter controls the rate of flow of granular solids through the apparatus. It can be used for diverting the flow of most granular solids from a common header to any of several terminals. Properties of the solids, such as density, size, size range, and angle of repose, influence the design details for the device, but the basic operating principle remains the same. The absence of mechanical equipment and moving parts makes the use of the diverter attractive where maintenance must be minimal or nonexistent.

HERBICIDES TESTED FOR LONG-TERM EFFECT ON WEEDS

(Order Stock No. PB-170 485 Field Evaluation of Soil-Applied Herbicides, HC $2.00/MF $0.50.)

Twenty-two soil-applied herbicide formulations are being evaluated by the U. S. Bureau of Reclamation for their ability to provide complete control of vegetation. The Bureau seeks long-term vegetation control on parking lots, power switchyards, transmission line and tower sites, and similar areas where weeds and other vegetation produces hazards or is objectionable to operational procedures. The herbicides were applied to replicated 1-sq-rod plots at 3 different application rates. Observational ratings of test plots over 3 years of study indicate that some triazine herbicides and a uracil herbicide are consistently effective in producing good vegetation control at the medium and high application rates. Only the triazine herbicide produced adequate control at the low rate. All inorganic herbicides lose their effectiveness after 3 seasons exposure, and most materials exhibit a significant decline in activity as compared to the first 2 years of study.

Control Systems and Instrumentation

PAPERS ON ELECTROMECHANICAL TRANSDUCERS LISTED

(Order Stock No. N66-17359 Bibliography on Electromechanical Transducers, HC $1.00/MF $0.50.)

A Space Agency bibliography prepared by Midwest Research Institute covers a variety of electromechanical transducers and assesses and identifies the literature on applications of these devices. Entries include abstracts on such uses as transient pressure measuring, the measurement of the torsional rigidity of stiffened plates and time-dependent shroud pressure fluids, the design of a 3000°F temperature transducer system, and a capacitive transducer for narrow-band vibratory displacements.

SYSTEMS FOR POSITION MONITORING REVIEWED

(Order Stock No. Y-1506 Position Monitoring Devices, HC $2.00/MF $0.50.)

A variety of mechanical, optical, and electrical systems are currently available for monitoring position, according to a Union Carbide monograph. The publication emphasizes those systems which have a range from a few inches to several feet. It groups the systems by operation, but in some complex systems two or more classes of operation exist. Whenever possible, a system is first explained according to the basic concept and an example is then given of a practical application. Observations on a system's accuracy are included.

DIGITAL INTEGRATOR BUILT INTO FLUIDICS CIRCUIT

(Order Stock No. N66-18313 Fluid Amplifier Digital Integrator, HC $3.00/MF $0.75.)

A fluid amplifier digital integrator has been described by General Electric as a basic building block in digital computation and control systems which can be used to solve nonlinear differential equations, multiply, and generate functions. Integration can be performed with respect to time or any other variable. A report of GE presents the fluid amplifier implementation of applicable digital logic equations and tells how 37 OR-NOR, flip-flop, and digital amplifier elements were assembled into a circuit comprising an adder, shift register, and complementer. The experimental digital integrator used serial implementation of 5 bit words and was operated at a nominal 100 cps clock frequency. GE's report presents experimental results which show the integrator's response to a step input as well as all of the detailed arithmetic operations within the integrator. An application showing the interconnection of integrators into a digital-differential-analyzer navigation system is included.

DEVICE DETECTS RADIOACTIVITY IN FLOWING WATER

(Order Stock No. K-1656 A Detector for Alpha Radioactivity in Flowing Water, HC $1.00/MF $0.50.)

Union Carbide has developed a detector for alpha radioactivity in flowing water that is capable of detecting alpha levels down to one percent of the maximum permissible concentration allowed for human consumption. The required maintenance is minimal, and it is suitable for location in a remote area. Union Carbide evaluated the performance of the detector for alpha activity in flowing water during long-term service monitoring of raw river water. The firm says the detector should prove to be a valuable addition to the large number of instruments now in use to safeguard and protect plant equipment and personnel. In spite of the history of satisfactory performance in this area, it is the policy of operators of plants processing radioactive chemicals to provide continuous or periodic inspection of streams in their areas to determine radioactivity levels.

Data Processing

SANDIA REPORTS ON FIVE-YEAR MAGNETICS PROGRAM

(Order Stock No. SC-RR-65-502 Status Report on Magnetics Technology in Advanced Data Systems, HC $5.00/MF $1.00.)

A Sandia Corporation monograph describes the collective results of their magnetics program which began in 1960 and made contributions in the fields of analog and digital storage as well as in those of logic and data handling. Chapter I describes the specific study projects which provided insight into existing tech-

nology, and presents the new techniques developed. It covers analog storage devices, shift register logic, drivers, carrier techniques, coincident magnetic logic, nonbinary logic and circuits, a series of miscellaneous devices and techniques, and a review of study projects. Chapter II gives the methods by means of which some of these techniques were synthesized into operating or proposed systems. It covers systems such as a waveform digitizer, linear feedback timer, magnetic-logic time-of-day clock, and a pulse jitter measurement system. Chapter III is a resume of the theory and principles of magnetics and is designed to serve as a useful guide to the techniques and systems presented in Chapters I and II. The report closes with a definitive bibliography that lists technical memoranda published by Sandia personnel, plus the essential findings published elsewhere in the field.

COMPUTER REPLACES BUFFERING DEVICES IN TELEMETRY PROCESSING

(Order Stock No. N66-22364 Integrated Telemetry-Computer System, HC $2.00/MF $0.50.)

A telemetry-computer integration project recently completed by the Space Agency shows that by coupling a computer to the output of a telemetry signal processing line in place of currently used buffering devices, immediate savings in time, manpower, and efficiency result. In addition, the following improvements are accomplished: (1) The computer replaces the special purpose equipment and eliminates duplication of function costs; (2) Magnetic tape recording equipment and storage space for reels of tape containing intermediate processed data is eliminated; (3) Manpower and transportation costs for movement of the magnetic tapes are removed; and (4) Time compression in the total data processing cycle is achieved; analog processing, physical tape movement, and computer analysis are incorporated so that all three functions are performed during the analog processing time. The high speed, general purpose, small scale, digital computer selected for this study was the CDC 160; the telemetry signal acquisition and conversion system consists of the pulse-frequency-modulation (PFM) data processor for the Explorer XII satellite. The time decoder converts standard NASA time codes to digital format. The latter two pieces of equipment were constructed at NASA's Goddard Space Flight Center.

Electronics

BATTELLE SURVEYS ELECTRONICS PHYSICS-OF-FAILURE

(Order Stock No. AD-472 738 Preindications of Failure in Electronic Components, HC $1.00/MF $0.75.)

A recently released state-of-the-art report by Battelle Memorial Institute is concerned with indications of potential degradation and catastrophic failure in electronic components. The objective of this survey is to present a comprehensive description of past, present, and future planned work on preindicators of

failure for certain electronic components. The study provides basic information for future development in automatic checkout equipment. The following electronic parts are covered: semiconductors (transistors, diodes, and microcircuits), resistors, capacitors, inductors, computer cores, other items used in a computer, and vacuum tubes. The results of the study show that predictors of failure for semiconductors have received more attention than other types of parts. Current noise and infrared emission profiles show promise as precursors that would apply to all types of semiconductors.

ELECTROLUMINESCENCE REPORTS EXAMINED

(Order Stock No. OTR-135 Electroluminescence, HC only, $1.00.)

A National Bureau of Standards review of literature on electroluminescence (EL) examines Government reports since 1962. It covers intrinsic EL and carrier injection EL. Reports examined refer to investigations of material properties and fabrication techniques, assembly and testing of various EL screens and display panels, and the use of carrier injection luminescent diodes as light sources. NBS notes an increasing interest in the last few years in the d.c. carrier injection EL. The Government has also sponsored a variety of programs in the past three years to develop new EL phosphor materials, panels, and related circuitry. Many potentialy applications exist for the phosphors in such devices as flat area light sources, display panels, readouts, computer memory and switching devices, and flat screen television. All reports examined in the review are available from the Clearinghouse.

Engineering and Construction

COMMERCIAL FREEZERS USED IN CONCRETE FREEZING AND THAWING TESTS

(Order Stock No. PB-170 367 Evaluation of Laboratory Equipment for Freezing and Thawing of Concrete, HC $2.00/MF $0.50.)

Commercially available automatic freezer equipment can be used for freezing and thawing tests of concrete and aggregate in concrete. According to a study made by the Virginia Highway Research Council for the U. S. Bureau of Public Roads, the equipment can provide a closely controlled and reproducible cycle meeting the requirements of ASTM C291, but when used for tests in accordance with ASTM C290 can result in excessive pressures and damage to specimens and containers. Other findings of the Research Council: equipment performance was mechanically excellent; tests conducted resulted in classification of the various concretes consistent with field service records; apparatus and procedures used give excellent estimates of the sensitivity of aggregates to freezing and thawing; concrete without entrained air fails after 10-20 cycles; and limits for termination of testing as set in ASTM C291 are compatible with the results of the project.

SYMPOSIUM PAPERS ON SHOCK AND VIBRATION PUBLISHED

(Order Stock No. AD-628 599 The Shock and Vibration Bulletin, Part 2, HC $6.00/MF $1.50;
AD-628 600, same title, Part 3, HC $6.00/MF $1.50;
AD-631 233, same title, Part 4, HC $6.00/MF $1.25;
AD-631 234, same title, Part 5, HC $7.00/MF $1.75;
AD-633 076, same title, Part 6, HC $7.00/MF $1.75;
AD-633 096, same title, Part 7, HC $6.00/MF $1.50.)
Part 1 is classified and is not available from the Clearinghouse.

The 139 unclassified papers presented at the 35th Symposium on Shock, Vibration and Associated Environments are now available in a 6-volume series published by the Shock and Vibration Information Center of the Naval Research Laboratory. The symposium was held in New Orleans, October 25-28, 1965 and was hosted by NASA's Marshall Space Flight Center. Papers in the six volumes are categorized into vibration testing, structural analysis, instrumentation, transportation and shock and vibration isolation, shock testing and specification of shock, prediction of vibration environment and damping and nonlinear analysis.

MACHINE TUNNELING EVALUATED BY M.I.T.

(Order Stock No. PB-170 511 Report on Hard-Rock Tunneling Investigation, HC $3.00/MF $0.75.)

Hard-rock tunneling, with special emphasis on tunneling machines, has been evaluated by the Massachusetts Institute of Technology for the U. S. Department of Commerce's Office of High Speed Ground Transportation Research and Development. It is part of an overall three-year R and D program which is investigating all modes of transport and looking into the possibilities of new modes which might travel on or above or below the ground. The MIT study evaluates hard-rock excavation methods, technological and cost trends for conventional hard-rock tunneling by drilling-and-blasting, and the state-of-the-art of machine tunneling with a forecast of future developments. Although important advances in drilling-and-blasting have been made in recent years, the MIT report says that the cost of tunnel excavation by this conventional method has been increasing and is likely to continue to increase. As to tunneling machines, they have been used successfully on civil engineering projects since 1953 and they exhibit several technical advantages over drilling-and-blasting: greater safety, less overbreak, less labor required, continuous excavation and muck removal, no blasting damage to nearby structures, and potentially faster rates of excavation. Tunneling machines have certain drawbacks, however, and much research and development work is needed to make them more versatile, reliable, and economical than they are today, the MIT report adds.

NUCLEAR CRATERING COSTS AND CONSTRUCTION TECHNIQUES STUDIED

(Order Stock No. PNE-5004P Construction Techniques and Costs for Underground Emplacement of Nuclear Explosives, HC $2.00/MF $1.25.)

The Army Corps of Engineers has completed an Operation Plowshare study on the equipment, methods, and costs that are considered feasible for constructing underground emplacements for nuclear explosives such as would be used in nuclear excavation. Their report discusses the available methods and techniques currently being used in 36-inch diameter and larger hole drilling, tunneling, and conventional shafting. Such big hole drilling methods can be divided into four types: churn, auger, calyx, and rotary drilling. Discussions concerning mining and shafting cover the conventional cyclic method of drilling and blasting, as well as the mechanical mining methods which in the past few years have gained considerable popularity. The Army's report gives cost analyses for big hole drilling and for tunneling and shafting which it says are believed realistic for the current period and are considered adequate for making preliminary cost estimates.

Food Processing

PERSISTENCE OF BACTERIA WITH FREEZE-DRIED FOODS PROBED

(Order Stock No. AD-633 390 A Study of the Microbiology of Selected Dehydrated Food Products, HC $3.00/MF $0.50.)

Midwest Research Institute has completed a study concerning the persistence of bacteria on freeze-dried foods following dehydration, and the proportional influence of the freezing and dehydration phases on the maintenance of viability during the processing of the foods. The study was undertaken because lyophilization is an often-used technique for maintaining cultures of microorganisms and questions have therefore arisen about the persistence of viable bacteria on freeze-dried foods. MRI's work took the form of inoculating fruits, meats, and vegetables with strains of Salmonella oranienburg, Staphylococcus aureus, Aerobacter aerogenes, Escherichia coli, Alcaligenes faecalis, and spores of Clostridium botulinum Type A. Then the reduction in viability of these bacteria during the freeze-drying process was determined, and calculations were made of the proportion of the total microbial reduction which was brought about by the freezing and by the drying phases of the process. MRI also determined the rate of reduction in bacterial numbers during storage.

Among the findings: (1) The freeze-drying process was found to reduce viability by 90 percent or more in the vegetative cells of 5 species of bacteria and 50 percent or more for spores of C1. botulinum. (2) The greatest reduction in bacterial numbers occurred during the freezing phase of the process. (3) The type of food on which the cells were dried influenced survival; foods high in organic acids appeared to support lower populations. (4) The loss of viability in bacteria was more rapid during early storage periods. (5) Storage temperature had a great influence on the rate at which the bacteria on the dry foods declined in viability. Bacterial numbers declined more rapidly at 100°F and 70°F than at 40°F.

TRANSPORTING GOODS STUDY IS OPERATIONAL COMPUTING TOOL

(Order Stock No. AD-631 311 Capacitated Transportation Problem With Convex Polygonal Costs, HC $2.00/MF $0.50.)

A new RAND Corporation report provides "an actual operational computing tool that should be of direct interest to operations research analysts and of indirect interest to anyone concerned with the transfer of goods." The report considers an extension of the classical transportation problem where a minimal cost schedule is derived for shipping a commodity from a set of origins to a set of destinations. In the classical model, however, the only constraints permitted are total capacities at origins and destinations, and the cost is strictly a linear function of the amount shipped on any route. The extension presented by RAND enables an upper bound to be put on each individual route. Furthermore, it permits increased or penalty costs to be imposed for excessive amounts shipped on any individual route. "The greater realism possible with this model," says the report, "should be of value to anyone concerned with transportation problems." The report gives constructive proofs leading to a machine-oriented algorithm for the extension considered. It employs many features of Fulkerson's out-of-kilter algorithm and also borrows heavily from the Balinski-Gomory primal algorithm for transportation problems. This new algorithm was developed to see how far the trade off between generality and computational efficiency can be exploited. Central to the algorithm is the labelling process described for general networks by Ford and Fulkerson and also used by Balinski and Gomory.

REPORT ANALYZES COSTS OF MANAGING COMPUTER PROGRAMMING

(Order Stock No. AD-631 259 Research Into the Management of Computer Programming: A Transitional Analysis of Cost Estimation Techniques, HC $6.00/MF $1.25.)

System Development Corporation's continuing research program directed toward the development of improved methods of estimating, collecting, and controlling costs for managers of computer programming activities has most recently analyzed indices of job difficulty, job type, development environment, and job uniqueness. It looks into a costliness factor that permits programming tasks to be ranked in respect to these ingredients, plus weighted composites of the indices for estimating the cost of particular programming jobs. It also gives scoring and confidence-band techniques for blending intuitive managerial judgments with the formal cost-estimation procedures. Supplementary findings include indications of the relative sensitivity of job cost to changes in the values for the indices, and preliminary comparisons of resource usage between programs produced in machine-oriented or procedure-oriented languages.

Marine Technology

RADIOISOTOPES PRACTICAL AS POWER FOR SMALL UNDERWATER VEHICLES

(Order Stock No. AGN-8135 Evaluations of Radioisotope Applications in Hydrospace, HC $5.00/MF $1.00.)

Radioisotope power sources to propel small submersible vehicles and as power sources for stationary underwater platforms definitely appears attractive, according to Aerojet-General Nucleonics. The U. S. Navy has indicated a need for engines producing 10 to 40 kw of shaft or electrical power. Use of such engines to propel submersibles engaged in commercial operations also appears very likely. Aerojet-General made a design analysis which indicates that a relatively simple reciprocating steam engine operating on saturated steam is the best power conversion technique. Use of this concept not only minimizes the development required, but also simplifies emergency cooling of the radioisotope fuel. The isotope engines have a higher operating cost than competitive systems, but the higher productivity of these engines can result in a lower cost for a given mission, particularly for applications requiring reasonably continuous use of the vehicle.

Metals, Non-Ferrous and Alloys

BERYLLIUM REVIEW CITES HIGH-TEMPERATURE APPLICATIONS

(Order Stock No. OTR-137 Beryllium, Its Characteristics and Applications, in HC only, $1.00.)

A Westinghouse review of beryllium's characteristics and applications at high temperatures and in nuclear technology searches the literature on Government R and D since 1959. Westinghouse notes that the metal has many attributes which make it attractive to industrial and Government designers of nuclear reactors and high performance aircraft. Its density is similar to that of magnesium, its strength when cold worked is 200,000 psi, and its fatigue properties are excellent. Its strength-to-weight ratio is about twice that of aluminum and three times that of stainless steel. It also has a modulus of elasticity 1-1/3 times that of steel and excellent thermal properties. However, there are certain difficulties encountered in the fabrication of beryllium which limit its use. These limitations evolve from its limited room-temperature ductility, poor weldability, low impact strength, toxicity, and high cost. Numerous Government programs are underway to find solutions to these problem areas.

COATINGS FOR TITANIUM ALLOYS

(Order Stock No. AD-633 038 Surface Treatments for Titanium Alloys, HC $3.00/MF $0.75.)

This Battelle Memorial Institute study describes procedures that have been developed on all coating systems for titanium alloys for which reports of significant R and D are available. The report does not attempt to assess the usefulness of the particular techniques.

THERMAL AND MECHANICAL TREATMENTS FOR NICKEL ALLOYS

(Order Stock No. AD-633 040 Thermal and Mechanical Treatments for Nickel and Selected Nickel-Base Alloys and Their Effect on Mechanical Properties, HC $5.00/MF $1.00.)

This Battelle work discusses the thermal and mechanical treatments to which this metal and its alloys are usually subjected. It particularly emphasizes the influence of these operations on mechanical properties, and describes equipment and procedures as well as the problems likely to be encountered and the precautions and corrective measures available.

Physics

SYMPOSIUM PAPERS ON INELASTIC SCATTERING PUBLISHED

(Order Stock No. BNL-940(C-45) Symposium on Inelastic Scattering of Neutrons by Condensed Systems, HC $6.00/MF $1.25.)

The 28 papers presented at the Symposium on Inelastic Scattering of Neutrons by Condensed Systems held at Brookhaven National Laboratory in September 1965 have been published. The Symposium marked the completion of the Brookhaven High Flux Beam Reactor. With the realization that further advances as well as new departures in the field of inelastic scattering will be greatly facilitated by a new generation of high flux reactors, BNL felt that a conference exploring the subject would be particularly appropriate and timely. The papers review accomplishments in broad areas of experimental and theoretical activity and suggest new objectives which might be realized with more powerful neutron sources.

HANDBOOK SUMMARIZES WORK ON NITROSO ELASTOMERS

(Order Stock No. AD-632 196 Nitroso Rubber Handbook, HC $3.00/MF $0.75.)

The Army's Natick Laboratories has prepared a handbook on the nitroso family of high polymers that summarizes in one convenient volume all the work performed on these elastomers. It is designed for use by materials engineers seeking specific applications, and for research scientists interested in synthesizing new materials. The handbook notes that the nitroso elastomers developed in the past eight years by Army-sponsored research are highly fluorinated or completely so, and as such are members of a specialty-type elastomer family. It is increasingly evident, however, that the combination of nitroso groups in the highly fluorinated linear polymer chain is responsible for the introduction of interesting and novel combinations. Thus, nitroso elastomers have good low temperature properties, solvent resistance, stability to corrosive environments, and flame resistance.

THERMALLY STABLE ELASTOMERS REVIEWED

(Order Stock No. OTR-138 Synthesis of Thermally Stable Elastomers, in HC only, $1.00.)

A Westinghouse review of the synthesis of thermally stable elastomers describes Government R and D programs since 1960 on new polymer synthesis and evaluation of compounds to improve the thermal stability of current elastomers. Westinghouse says progress has been made in each of these areas, particularly with polyesters, fluorine and boron polymer materials as well as with silazanes, siloxanes, and fluorocarbons. The goal of Government programs in the past decade has been to extend the useful upper temperature limit to at least 800°F with an ultimate objective of 1000 - 1200°F. Two factors are required for a polymer to exist at elevated temperatures: (1) no significant portion of its chemical bonds should degrade, and (2) the intermolecular forces and molecular entanglement responsible for elasticity must remain effective. Polyesters in particular have been improved and now exhibit high tensile strengths, good tear resistance, high abrasion resistance, fair elasticity, good solvent resistance, and excellent ozone and oxidation stability.

RESEARCH & DEVELOPMENT REPORTS

1A. AERODYNAMICS

AD-286 675 **Field 1A, 14B**
FFSTI Price: HC$15.70
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
THE CURVATURE OF SHOCK FRONTS IN SHOCK TUBES.
Technical note (Doctoral thesis),
by P. C. T. de Boer. Jul 62, 161p BN-297
Contract AF 49 (638)-401

Descriptors: (*Shock tubes, Shock waves), (*Shock waves, Curved profiles), Relaxation time, Schlieren photography.

Identifiers: Theses.

The investigation was undertaken in order to analyze certain difficulties experienced with shock tube measurements of high resolution on relaxation phenomena behind shock waves were analyzed, making use of the so-called integrating schlieren method. The topic of major interest is the curvature of the shock waves, and most attention is concentrated on the curvature effects to be expected under circumstances where no relaxation occurs. Some forms of interference between the two effects were briefly treated. (Author)

AD-442 394 **Field 1A, 22C**
CFSTI Price: HC$3.60
Boeing Co., Seattle, Washington.
TWO DIMENSIONAL OR AXIALLY SYMMETRIC REAL GAS FLOWS BY THE METHOD OF CHARACTERISTICS. PART II: FLOW FIELDS AROUND BODIES,
by D. W. Eastman. 10 Jul 63, 35p Rept. no. D2-10598
N64 23382

Descriptors: (*Axially symmetric flow, Supersonic flow), (*Two-dimensional flow, Supersonic flow), (*Aerodynamic configurations, Supersonic characteristics), Programming (Computers), Blunt bodies, Hypersonic flow, Airfoils, Ogives, Conical bodies, Cylindrical bodies, Shock waves, Reentry vehicles.

Identifiers: Method of characteristics.

The document presents a summary of results from a digital computer program for calculating inviscid supersonic flow fields around two-dimensional bodies or axisymmetric bodies at zero angle of attack. The program, based on the method of characteristics, can be used for either perfect or real gas in thermodynamic equilibrium and can calculate flow fields around bodies with flares or concave curvature. Results are presented for both sharp and blunt nosed bodies in perfect and real gas. Whenever possible, they were compared with experimental data. (Author)

AD-443 562 **Field 1A, 14B**
CFSTI Price: HC$3.60
Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
DEVELOPMENT OF A TRACER-SPARK TECHNIQUE FOR THE STUDY OF HYPERVELOCITY FLOW FIELDS,
by James B. Kyser. May 64, 38p SUDAER-190, Technical rept. no. 2,
Contract Nonr-225 (65),
Proj. NR-061-133,
N64 32969

Descriptors: (*Flow visualization, Hypersonic flow), (*Hypersonic flow, Flow visualization), Sparks, Hypersonic wind tunnels, Tests, Velocity.

A technique was developed for the mapping of velocity fields, with particular application to testing in a spark-heated hypersonic tunnel. Data were obtained in the form of photographs of sparks struck through the flow field under study. Instrumentation to initiate the sparks in the flow was designed and fabricated, and its performance has been studied analytically and experimentally. Velocity profiles were obtained in the empty test section with a high degree of success. Attempts to measure velocity profiles in wakes were not as successful, however. (Author)

AD-450 558 **Field 1A, 22C, 16D**
CFSTI Price: HC$4.60
GM Defense Research Labs., Santa Barbara, Calif. Aerospace Operations Dept.
BODY SHAPE EFFECTS ON AXISYMMETRIC WAKES,
by L. N. Wilson. Oct 64, 46p Technical rept. TR-64-02K
Contract DA-01-021-AMC-11359 (Z), ARPA Order-347

Descriptors: (*Hypervelocity projectiles, Wake), (*Blunt bodies, Wake), (*Slender bodies, Wake), (*Wake, Axially symmetric flow), (*Hypersonic flow, Wake), Turbulence, Aerodynamic configurations, Physical properties, Reentry vehicles, Guided missiles.

Experimental measurements were made of the distance of transition to turbulence of the wake behind hypersonic spherical and blunted-cone models at hypersonic speeds in a ballistic range. Transition distances behind blunt bodies were found to be independent of body shape, whereas a definite shape effect was observed for slender bodies. A single shape parameter was determined which successfully correlated all the slender body data. The transition process was found to be markedly different between blunt and slender body flows, the transition occurring rather abruptly behind blunt bodies and being extended over many body diameters for slender bodies. In all cases, the transition distances were independent of body size and flight speed. The correlations were found to break down at high Reynolds numbers where turbulence originated at the recompression region. A method of using the distance to transition in clean wakes to discriminate between blunt and slender bodies is outlined. (Author)

AD-453 217 **Field 1A**
CFSTI Price: HC$4.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
BOUNDARY-LAYER, PRESSURE, AND TEMPERATURE DISTRIBUTION STUDIES ON SEVERAL ISENTROPIC COMPRESSION SURFACES AT MACH NUMBERS FROM 4 TO 8.
Technical documentary rept.,
by R. W. Rhudy, and F. K. Hube. Dec 64, 44p AEDC-TDR-64-268
Contract AF 40 (600)-1000,
Proj. ARO-VTO306
N65 18473
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Aerodynamic configurations, Hypersonic characteristics), (*Hypersonic characteristics, Surfaces), (*Supersonic characteristics, Surfaces), Temperature, Boundary layer, Pressure, Distribution, Compressive properties.

Boundary-layer, pressure, and temperature measurements were obtained on the generating cylinder and isentropic compression surface of several axisymmetric hypersonic inlet configurations at supersonic and hypersonic Mach numbers. Boundary-layer surveys were performed at selected stations on uncooled Mach 5, 6, and 10 inlets and a cooled Mach 8 inlet. Model surface temperatures and pressures were obtained at several Mach numbers on all configurations. Steady-state heat transfer data were obtained on the Mach 8 inlet at several model wall temperatures. Selected results from the tests are presented. (Author)

AD-454 078 **Field 1A, 4A**
CFSTI Price: HC$14.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ALTITUDE-VELOCITY TABLE AND CHARTS FOR IMPERFECT AIR.
Technical documentary rept.,
by Clark H. Lewis, and E. G. Burgess. Jan 65, 150p AEDC-TDR-64-214
Contract AF 40 (600)-1000
N65 14996
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Shock waves, Upper atmosphere), High altitude, Velocity, Tables, Air, Thermodynamics, Reynolds number, Physical properties.

Normal shock wave parameters are presented in tabular and graphical form over the ranges of altitude = 10,000 (10,000) 4 x 100,000 ft and velocity = 6000 (1000) 50,000 ft/sec. The results are tabulated in the form of ratios of enthalpy, pressure, density, and temperature with the free-stream quantity. In addition, speed of sound, compressibility factor, sphere stagnation heat transfer rate, and free-stream unit Reynolds number are also given. Altitude-velocity charts are given for the sphere stagnation heat-transfer rates based on Fay and Riddell and Fay and Kemp are presented. (Author)

AD-460 154 **Field 1A, 14B**
CFSTI Price: HC$3.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
LIFT, DRAG, AND STATIC STABILITY OF A BLUNT CONICAL MODEL IN HYPERSONIC RAREFIED FLOW,
by David E. Boylan. Mar 65, 32p AEDC-TR-65-62
Contract AF 40 (600)-1000,
Projs. AF-8953, ARO-VL2407
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Conical bodies, Hypersonic characteristics), (*Hypersonic characteristics, Blunt bodies), (*Balances, Hypersonic wind tunnels), Lift, Drag, Stability, Afterbodies, Superaerodynamics, Force (Mechanics).

The report contains results and analysis of measurements of forces on spherically capped cones of 10-deg half-angle, with and without conical afterbodies. These data were obtained during the course of an evaluation of a new three-component balance for use in a low-density, hypersonic wind tunnel. Comparisons are made with modified Newtonian and free-molecule theories. Measurements were made in nitrogen gas at a nominal Mach number of 9.8 and unit Reynolds number of 760/in. The suitability of the low-load, three-component balance for measuring aerodynamic forces in low-density flows is demonstrated. (Author)

AD-463 164 **Field 1A**
CFSTI Price: HC$3.60
Lincoln Lab., Mass. Inst. of Tech. Lexington.
PRODUCTION AND PROPAGATION OF SPHERICAL SHOCK WAVES AT LOW AMBIENT PRESSURES,
by W. M. Kornegay. 26 Jan 65, 33p Technical rept. TR-375
Contract AF 19 (628)-500, ARPA Order-600
ESD TDR-65-35

Descriptors: (*Shock waves, Propagation), Production, Pressure, Glass, Spheres, Impact shock, Air.

An experimental investigation was made of the spherical shock waves produced when 2-cm-diameter thin-walled glass spheres, which were filled with air at a pressure of about 760 torrs, are burst in an ambient environment of dry air at pressures

ranging from 0.015 to 5.0 torrs. Piezoelectric pressure transducers were used to measure the rate of decay of the spherical-shock Mach number with increasing radius. A comparison of the experimentally observed shock Mach numbers with those predicted from calculations based on an approximate theory by Friedman and Whithman shows that the two are in good agreement. Shock overpressures and shock thickness determined from impact pressure records are in fair agreement with existing approximate theories. The effect of glass particles on the flow field was found to be important when the initial pressure ratio across the glass diaphragm is below 500. At low pressures, viscous and rarefied flow phenomena tend to cause the measured impact pressure to depart radically from the theoretical value for continuum flow. (Author)

AD-467 829 **Field 1A, 16B**
CFSTI Prices: HC$3.00 MF$0.50
Army Missile Command, Redstone Arsenal, Ala. Advanced Systems Lab.
THE ZERO-LIFT FOREDRAG AND BODY BASE DRAG COEFFICIENTS OF A SERIES OF RING TAIL-STRUT-BODY CONFIGURATIONS AT MACH NUMBERS FROM 0.80 TO 4.50.
Technical rept.,
by Paul R. Connolly. 28 May 65, 37p
Proj. DA-1B222901A206
AMC RD-TR-65-8

Descriptors: (*Drag, Aerodynamic configurations), (*Aerodynamic configurations, Drag), Subsonic flow, Transonic flow, Supersonic flow, Tests, Interference.

An investigation of the aerodynamic characteristics of a family of ring tail-strut-body configurations was conducted at Mach numbers from 0.80 to 4.5. Rings varying from 1.25 to 2.50 calibers in diameter and from 0.60 to 1.50 calibers in length were tested. They were tested at various longitudinal positions and with internal expansion angles from 0 deg. to 6 deg. The effect of changing from circular section support struts to streamlined struts was also investigated. This report presents the zero-lift foredrag and base drag results and compares them, wherever possible, with theoretical estimates. (Author)

AD-469 041 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EXPANSION OF A JET INTO NEAR VACUUM.
Technical rept.,
by R. A. Cassanova, and W. B. Stephenson. Aug 65, 99p AEDC-TR-65-151
Contract AF40(600)-1000,
Proj. ARO-SA-0418
N-65 33689
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Jets, Nozzle gas flow), (*Exhaust gases, Gas flow), Vacuum, Superaerodynamics, Argon, Nitrogen, Pressure.

The flow field of nozzles exhausting into a vacuum was investigated both analytically and experimentally. The applicability of the method of characteristics for jet expansions into a free molecular environment is discussed. Fifteen-degree, half-angle, conical nozzles with area ratios of 1.0 to 207 were tested with argon and nitrogen at total pressures of 100, 50, and 35 psia. Ambient pressures of .0001 to .000001 torr yielded total pressure to ambient pressure ratios of 10,000,000 to 10 to the 9th power. Properties of the flow field were determined by the use of flat plates and flow direction vanes. (Author)

N66-21137 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AERODYNAMIC CHARACTERISTICS OF VARIOUS CONFIGURATIONS OF A MODEL OF A 45 DEG SWEPT-WING AIRPLANE AT A MACH NUMBER OF 2.01,
by C. Driver, M. L. Spearman, and R. B. Robinson. 26 May 55, 41p
NACA RM-L54J08

Descriptors: *Aerodynamic characteristics, *Fighter aircraft, *Swept wing.

N66-21562 **Field 1A**
CFSTI Prices: HC$5.00 MF$1.25
North American Aviation, Inc., Downey, Calif. Flight Sciences Dept.
STUDY OF FLOW FIELDS ABOUT AXISYMMETRIC BLUNT BODIES AT LARGE ANGLE-OF-ATTACK.
Final rept.
29 Oct 65, 183p SID-65-1353
Contract NAS9-3159
NASA CR-65329

Descriptors: *Angle of attack, *Axisymmetric body, *Flow field, *IBM 7094 computer.

N66-21563 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
TRANSONIC WIND-TUNNEL INVESTIGATION OF THE EFFECT OF CONTROL SPAN AND LARGE WING-TIP NACELLES ON EFFECTIVENESS OF SPOILER-SLOT-DEFLECTOR CONTROLS ON AN UNSWEPT-WING FIGHTER-TYPE AIRPLANE,
by D. E. Wornom. May 60, 34p NASA-TM-X-280

Descriptors: *Nacelle, *Aircraft control, *Control surface, *Wind tunnel.

N66-21585 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
STATIC LONGITUDINAL AND LATERAL AERODYNAMIC CHARACTERISTICS AT A MACH NUMBER OF 2.01 OF A TAILLESS DELTA V/STOL CONFIGURATION HAVING VARIABLE-SWEEP WING PANELS,
by G. V. Foster, and M. L. Spearman. Dec 61, 36p NASA-TM-X-634

Descriptors: *Delta wing, *Stol aircraft, *Variable sweep, *Aerodynamic characteristics, *Tailless aircraft.

N66-21658 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
Alabama Univ. Research Inst., Huntsville.
HYPERSONIC NON-EQUILIBRIUM FLOW AND ITS THERMODYNAMIC RELATIONS,
by R. Hermann. Nov 65, 90p UARI-30
Grant NsG-381
NASA CR-71398

Descriptors: *Hypersonic flow, *Nonequilibrium flow, *Real gas, *Thermodynamic property.

N66-21692 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
TRANSONIC AERODYNAMIC CHARACTERISTICS OF A TAILLESS FIXED-WING SUPERSONIC TRANSPORT MODEL,
by E. J. Ray, and R. T. Taylor. Apr 66, 77p
NASA-TM-X-1214

Descriptors: *Aerodynamics, *Supersonic transport, *Tailless aircraft, *Transonic wind tunnel, *Fixed-wing aircraft.

N66-21702 **Field 1A**
CFSTI Prices: HC$4.00 MF$1.00
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AERODYNAMIC DATA ON A LARGE SEMISPAN TILTING WING WITH 0.5-DIAMETER CHORD, DOUBLE-SLOTTED FLAP, AND BOTH LEFT-HAND AND RIGHT-HAND ROTATION OF A SINGLE PROPELLER,
by M. P. Fink, L. C. White, and R. G. Mitchell. Apr 66, 121p NASA-TN-D-3375

Descriptors: *Aerodynamic characteristics, *Tilt-wing aircraft, *V/stol aircraft, *Wind tunnel, *Propeller drive.

N66-21705 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
AN INVESTIGATION OF SPLITTER PLATES FOR THE AERODYNAMIC SEPARATION OF TWIN INLETS AT MACH 2.5,
by A. L. Braslow, J. B. Peterson, Jr., and G. W. Moseley. Apr 66, 52p NASA-TN-D-3385

Descriptors: *Inlet flow, *Supersonic aircraft, *Split flap, *Twin jet.

N66-21729 **Field 1A**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
NEWTONIAN AERODYNAMICS FOR GENERAL BODY SHAPES WITH SEVERAL APPLICATIONS,
by W. H. Heybey. 7 Feb 66, 59p NASA-TM-X-53391

Descriptors: *Aerodynamic vehicle, *Mathematical model, *Newtonian fluid, *Reentry body.

N66-21807 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
Purdue Univ., Lafayette, Ind. School of Aeronautics, Astronautics and Engineering Sciences.
STUDY OF RECIRCULATING GAS FLOW FIELDS IN THE BASE REGION OF SATURN-CLASS VEHICLES.
Quarterly progress rept., 1 Aug-31 Oct 65,
by R. F. Hoglund. 1965, 28p
Contract NAS8-11485
NASA CR-71530

Descriptors: *Chemical reaction, *Saturn launch vehicle, *Flow field, *Gas flow, *Turbulent boundary layer.

N66-22179 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
PROPELLER-ROTOR WHIRL FLUTTER.
State-of-the-Art Review,
by W. H. Reed III. 1965, 44p NASA-TM-X-56678
Prepared for presentation at the Symposium on the Noise and Loading Actions on Helicopter V/STOL Aircraft and Ground Effect Machines, Southampton, England, Aug-13 Sep 1965.

Descriptors: *Flutter, *Turboprop aircraft, *Vertical takeoff ; landing (VTOL), *Propeller blade, *VTOL aircraft, *Whirl instability.

N66-22270 **Field 1A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
FLIGHT INVESTIGATION OF STABILITY AND CONTROL CHARACTERISTICS OF A 0.18-SCALE MODEL OF A FOUR-DUCT TANDEM V/STOL TRANSPORT,
by D. C. Freeman, Jr., and W. A. Newsom, Jr. Apr 66, 49p NASA-TN-D-3055

Descriptors: *Control stability, *Ground effect, *V/stol aircraft, *Flight stability test, *Scale model.

N66-22273 Field 1A
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
HYPERSONIC AERODYNAMIC CHARACTERISTICS OF AIRCRAFT CONFIGURATIONS WITH CANARD CONTROLS,
by C. W. Brooks, Jr., and C. D. Cone, Jr. Apr 66, 60p NASA-TN-D-3374

Descriptors: *Canard, *Control surface, *Aerodynamic characteristics, *Aircraft configuration, *Hypersonic aircraft.

N66-22274 Field 1A
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
EFFECTS OF BLUNTNESS ON THE SUBSONIC DRAG OF AN ELLIPTICAL FOREBODY,
by R. J. McGhee, and J. D. Norris. Apr 66, 23p NASA-TN-D-3388

Descriptors: *Drag, *Elliptical cylinder, *Blunt body, *Cylindrical afterbody, *Forebody, *Subsonic flow.

N66-22278 Field 1A
CFSTI Prices: HC$4.00 MF$0.75
Wichita Univ., Kans.
A REVIEW OF THE PLANFORM EFFECTS ON THE LOW-SPEED AERODYNAMIC CHARACTERISTICS OF TRIANGULAR AND MODIFIED TRIANGULAR WINGS,
by K. Razak, and M. H. Snyder, Jr. Apr 66. 101p
Grant NGR-17-003-002
NASA CR-421

Descriptors: *Airflow, *Lift, *Aerodynamic characteristics, *Triangular wing, *Wing planform.

N66-22361 Field 1A
CFSTI Prices: HC$2.00 MF$0.50
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
APPLICATION OF THE INVERSE TECHNIQUE TO THE FLOW OVER A BLUNT BODY AT ANGLE OF ATTACK,
by W. W. Joss. Apr 66, 31p
Contract NASr-119
NASA CR-445

Descriptors: *Bow shock, *Computer method, *Flow field, *IBM 7044 computer.

N66-22375 Field 1A
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
STATIC LONGITUDINAL AND LATERAL AERODYNAMIC CHARACTERISTICS AT A MACH NUMBER OF 2.20 OF A V/STOL AIRPLANE CONFIGURATION WITH A VARIABLE-SWEEP WING AND WITH A SKEWED WING DESIGN,
by G. V. Foster, and O. A. Morris. Apr 61, 33p
NASA-TM-X-521

Descriptors: *Swept wing, *V/Stol aircraft, *Variable sweep, *Aerodynamic characteristics, *Static aerodynamic characteristics.

PB-169 956 Field 1A
CFSTI Price: HC$4.60
California Inst. of Tech., Pasadena. Guggenheim Aeronautical Lab.
EXPANSION PROCEDURES AND SIMILARITY LAWS FOR TRANSONIC FLOW. PART I. SLENDER BODIES AT ZERO INCIDENCE,
by J. D. Cole, and A. F. Messiter. Jan 56, 41p
Contract AF 18 (600)-383
AFOSR TN-56-1

Descriptors: (*Transonic flow, Approximation (Mathematics)), (*Slender bodies, Transonic characteristics), (*Wings, Transonic characteristics), Boundary layer.

Identifiers: Similarity theory.

The purpose of the report is to provide a detailed and comprehensive account of a transonic approximation as applied to flows past wings and bodies. It is mainly concerned with the derivation of approximate equations, boundary conditions, etc., rather than with the more difficult problem of the solution of transonic flow problems.

AD-407 965 See Field 22C

AD-633 565 See Field 1C

1B. AERONAUTICS

AD-419 098 Field 1B
CFSTI Price: HC$17.30
Federal Aviation Agency, Washington, D. C. Systems Research and Development Service.
CONSOLIDATED ABSTRACTS OF TECHNICAL REPORTS 1957-1962, VOLUME 1.
Jan 63, 177p

Descriptors: (*Civil aviation, Scientific research), Bibliographies, Abstracts, Documentation, Aviation accidents, Air traffic control systems, Communication systems, Terminal flight facilities, Airports, Operations research, All-weather aviation, Aviation safety.

This publication contains abstracts of technical reports which have been approved for general distribution. These reports have been prepared by or for the Systems Research and Development Service in connection with various scientific or technical projects, tasks or contracts, and bear information beneficial to the general aviation industry and community. This publication is a consolidated compilation of all abstracts of technical reports which have been approved for general distribution and issued from the year 1957 to 1962, and supersedes any previous listings. Abstracts are identified by name of the contractor or preparing SRDS division, title, author, data, number of pages, type of report, and project, task or contract number. Indexes which have been prepared by the Information Retrieval Section, MS-112, FAA Headquarters Library Branch, are provided and categorized by subject, title, contractor, and FAA contract number. (Author)

AD-430 516 Field 1B
CFSTI Price: HC$1.10
Naval Research Lab., Washington, D. C.
THE COMPUTATION OF EFFECTIVE DISPLAY SENSITIVITY IN AIRCRAFT LANDING,
by Barbour Lee Perry. 17 Jan 64, 8p NRL-6055
Task RS-1170-011/6521/F002-09-02

Descriptors: (*Carrier landings, Mathematical analysis), Glide path systems, Display systems, Sensitivity.

In analyzing the altitude control loop in carrier landing, it is necessary to examine the geometry involved in the calculation of effective display sensitivity. This report describes the method of determining this gain for a deck-mounted display of glide path error. Of particular utility in comparing existing systems with one another or with proposed new systems in the concept of 'relative display sensitivity,' which is the ratio of the effective display sensitivity of one display to that of another. (Author)

AD-633 630 Field 1B
CFSTI Prices: HC$1.00 MF$0.50
Army Aeromedical Research Unit, Fort Rucker, Ala.
EXPECTED INJURY RATES FOR EXPERIMENTAL AIRBORNE OPERATIONS,
by R. A. Avner. Jun 66, 13p USAARU-66-7
Proj. DA-3A0-2560-1A-819,
Task 036

Descriptors: (*Parachute jumping, Aviation injuries), (*Aviation injuries, Mathematical prediction), Probability, Casualties, Experimental design, Statistical analysis, Army personnel.

Probability of injury for Army paratroopers under conditions of full combat load and unprepared drop zone was estimated to be .006 (standard error = .002, N = 5,253). Tables were computed to allow tests of departure from this rate under experimental conditions involving up to 50 jumpers. (Author)

AD-633 965 See Field 17G

1C. AIRCRAFT

AD-407 437 Field 1C, 21E, 17G
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
TIME- AND FUEL-OPTIMAL ATTITUDE CONTROL,
by Michael Athans. 23 May 63, 30p 22G-9
Contract AF 19 (628)-500

Descriptors: (*Attitude control systems, Optimization), (*Thrust vector control systems, Optimization), Differential equations, Control sytems, Complex variables, Orbital trajectories, Nonlinear systems, Satellites (Artificial), Sequences, Vernier rocket motors, Propellant control, Fuel consumption.

The problem of attitude control of a body described by the equation I theta (t) = tau (t) is examined, where I is the moment of inertia, theta (t) is the angular displacement, and tau (t) is the torque exerted by the reaction jets. Under existing restrictions the time-optimal and the fuel-optimal control laws are derived and the design of the corresponding optimal controllers is presented. (Author)

AD-633 565 Field 1C, 1A
CFSTI Prices: HC$2.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
STORE SEPARATION INVESTIGATIONS BY GRID METHOD USING WIND TUNNEL DATA,
by Millard J. Bamber. Apr 66, 28p Aero-1107
Proj. 645-166
DTMB 2202

Descriptors: (*External stores, Launching), Separation, Aerodynamics, Wind tunnels, Flight paths, Bombs, Mathematical prediction.

A system was developed to obtain and process wind-tunnel test data on a store in the presence of an airplane, so that the data could be used by a digital computer to predict store separation characteristics following launch. A separation was computed by the grid method using these data, for comparison with a trajectory obtained by the point prediction method. These trajectories were in good agreement. Trajectories were also analyzed to determine the effect of various separation parameters. (Author)

AD-633 603 Field 1C, 11I
CFSTI Prices: HC$1.00 MF$0.50
Sea-Space Systems, Inc., Torrance, Calif.
S-FAB BALLOON FLIGHTS: EXPERIMENTAL BALLOONS FABRICATED WITH S-FAB POLYPROPYLENE TRI-LAMINATE FILM.
Final rept.,
by Dale W. Cox. Apr 66, 16p SSS-4041
Contract Nonr-4775 (00),
Proj. NR-211-094

Descriptors: (*Balloons, *Laminated plastics), Flight, Films, Polyethylene plastics), Performance (Engineering).

Flight and technical data on two experimental balloons fabricated from a new balloon film, S-FAB, is presented. S-FAB is a tri-laminate of polyethylene/polypropylene/ polyethylene. (Author)

AD-633 621 **Field 1C, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Dayton Univ., Ohio. Research Inst.
BALLISTIC BEHAVIOR OF ADHESIVELY BONDED HONEYCOMB ALUMINUM PANELS FOR AIRCRAFT: PART II.
Technical rept. for 15 Oct 65-15 Apr 66,
by Robert F. Rolsten, Harold H. Hunt, and R. J. Vossler.May 66, 27p
Contract AF 33 (615)-2040,
Proj. AF-7360,
Task 736006
AFML TR-66-135

Descriptors: (*Airplane panels, Impact tests), (*Terminal ballistics, Sandwich panels), (*Sandwich panels, *Honeycomb cores), Aluminum, Ammunition damage, Panels (Structural), Bonded joints, Adhesives.

Adhesively bonded honeycomb panels commonly used with high-performance aircraft were subjected to ballistic impact from a military .30 calibre round to analyze target response qualitatively. Structural panels were impacted by a 150-grain projectile traveling at about 3000 ft/sec at angles of 90 (normal), 45 and 15 degrees. These data were duplicated and verified by independent tests conducted at the Ballistic Research Laboratories (BRL), Aberdeen, Maryland. In addition, BRL conducted impact tests with a military .50 calibre as well as simulated high-explosive fragments for assessment of the problem of deflagration and conflagration of fuel. It can be concluded from the data that grazing impacts can cause extensive damage to adhesively bonded honeycomb panels. Careful consideration should be given to the hazards involved when such construction is utilized on attack aircraft. (Author)

AD-633 636 **Field 1C**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
AN ESTIMATING RELATIONSHIP FOR FIGHTER/INTERCEPTOR AVIONIC SYSTEM PROCUREMENT COST,
by C. Teng. May 66, 35p RM-4851-PR (Abridged)
Contract AF 49 (638)-1700

Descriptors: (*Aircraft equipment, Electronic equipment), (*Fighters, Electronic equipment), (*Electronic equipment, *Costs), Airborne, Fire control systems, Communication systems, Navigation, Procurement, Bombs.

Identifiers: Avionics systems.

The memorandum examines the procurement cost of aircraft electronic systems. The results are based on the procurement cost of ten fighter/interceptor avionic systems. The research effort on avionic cost followed two distinct approaches: (1) an attempt to relate the cost of individual electronic subsystems (fire control, bomb-navigation, communications, etc.) to the characteristics of these subsystems; and (2) an attempt to relate total airborne electronic equipment (or total avionic system) cost for aircraft performing similar military missions (long-range intercept, strategic bombardment, etc.) to aircraft design and performance characteristics.

AD-633 698 **Field 1C, 13J, 13F**
CFSTI Prices: HC$3.00 MF$0.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
AIR-CUSHION TRANSPORTS (SELECTED ARTICLES),
by S. A. Adasinskii. 31 Jan 66, 56p FTD-MT-65-564
TT 66-61412
Edited machine trans. of mono. Akademiya Nauk SSR. Transportnye Mashiny na Vozdushnoi Podushke, Moscow, 1964 p23-43, 79-102, 107.

Descriptors: (*Ground effect machines, Transportation), USSR, Motion, Thrust, Control systems, Maneuverability, Aerodynamic configurations, Aerodynamic control surfaces, Effectiveness, Economics.

Contents: Horizontal motion, creation of thrust, and control; dimensions and structural forming; Soviet air-cushion machines; certain questions of theory; problems of further improvement; wheelless train on an air lubricant; place of 'flying' machines among other forms of transport economic effectiveness.

AD-633 862 **Field 1C, 13J, 13F**
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics Corp., Groton, Mass. Electric Boat Div.
THE DESIGN OF SINGLE-PROPELLER AIR CUSHION VEHICLE CONTROL CONFIGURATIONS.
Final rept.,
by Frank J. Hannigan.25 Mar 66, 88p Rept. no. U411-66-003
Contract NObs-92050
Proj. SS215-00
Task 10302
See also AD-620 144

Descriptors: Ground effect machines, *Control systems), Maneuverability, Propellers (Aerial), Control surfaces, Aerodynamic control surfaces, Marine rudders, Jets, Rockets, Mathematical models, Motion, Center of gravity, Configuration.

If the main thrust propeller is mounted on a rotatable pylon and is located slightly in front of the center of gravity, it can be combined with any adequate yaw-generating devices for excellent maneuvering control. Three yaw controllers produce quick turning response on the vehicle as well as allowing full use of the available side force. When a small additional propeller, either variable-pitch or rotatable, is used, sufficient yaw moment can be generated with a low horsepower engine. Roll control should be combined with each of the configurations. When roll is usable, it provides a significant additional side force. Side air jets can be used for yaw control but detailed tests must be performed to determine the effect of their use on the vehicle height and roll angle. The single-forward-thrust-propeller vehicle can be designed so that it is superior in maneuverability to the vehicle with two thrust propellers aft. The general conclusion is that an extremely maneuverable single-propeller vehicle can be designed if the main thrust propeller is located close to the c.g.. If it is any distance behind the c.g., maneuverability decreases. With the propeller at or slightly in front of the center of gravity, control is excellent. (Author)

AD-633 894 **Field 1C**
CFSTI Prices: HC$1.00 MF$0.50
David Taylor Model Basin, Washington, D. C. Aerodynamics Lab.
TESTS OF THE EFFECTS OF EXIT LENGTH AND CAMBER ON THE STATIC EFFICIENCY OF SHROUDED PROPELLERS.
Final rept.,
by Arthur E. Johnson. Mar 66, 17p Aero-1105
DTMB 2174

Descriptors: (*Shrouded propellers, Effectiveness), Camber, Configuration, Tests, Statics.

The static efficiency of a group of shrouded propellers with exists of various lengths and cambers has been measured experimentally and compared with potential theory calculations. Ratios of shroud chord to exit diameter ranged from 0.40 to 0.55. Straight exit sections and diffusing sections with radii of curvature of 77 and 40 percent of the propeller diameter were tested. The diffusing shrouds with the gentler curvature were found to be the most efficient. (Author)

AD-633 989 **Field 1C**
CFSTI Prices: HC$3.00 MF$0.75
RAND Corp., Santa Monica, Calif.
COST-ESTIMATING RELATIONSHIPS FOR AIRCRAFT AIRFRAMES,
by G. S. Levenson, and S. M. Barro. May 66, 98p RM-4845-PR (abridged)
Contract AF 49 (638)-1700

Descriptors: (*Airframes, *Costs), (*Aircraft, Airframes), Mathematical prediction, Production, Equations, Quality control, Flight testing.

The memorandum presents a set of generalized cost-estimating relationships for estimating development and production costs of aircraft airframes. It provides estimating equations for the following cost elements: initial and sustaining engineering, development support, flight test operations, tooling provision and sustaining tooling, manufacturing labor and material, and quality control.

N66-21639 **Field 1C**
CFSTI Prices: HC$8.75 MF$2.75
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
NACA CONFERENCE ON AIRCRAFT LOADS, FLUTTER, AND STRUCTURES. COMPILATION OF PAPERS.
1953, 575p NASA-TM-X-57364
Conference held at NASA, Langley Research Center, 2-4 Mar 1953.

Descriptors: *Flutter, *Aerodynamic load, *Aircraft structure, *Conference, *Flight stress.

AD-634 033 **See Field 11H**

1E. AIR FACILITIES

AD-633 966 **See Field 13F**

2B. AGRICULTURAL ECONOMICS

AD-633 987 **Field 2B, 8F**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
LAND SETTLEMENT STRATEGIES AND THEIR EVALUATION,
by Delbert A. Fitchett. Apr 66, 18p P-3354

Descriptors: (*Agriculture, Latin America), Natural resources, Geography, Political science, Sociology, Economics.

While population pressures increase in the traditionally settled areas of many Latin American countries, a number of these nations have within their boundaries vast, virtually unpopulated regions. The advance of settlers into these unpeopled tracts has, at times, become nearly legendary, e.g., the swashbuckling bandeirantes of Brazil. This paper discusses some of the characteristics of various land settlement strategies and relevant considerations for evaluating the economic aspects of land settlement projects. (Author)

PB-170 053 **See Field 5C**

PB-170 277 **See Field 5C**

PB-170 343 **See Field 5C**

2D. AGRONOMY AND HORTICULTURE

PB-170 343 **See Field 5C**

2F. FORESTRY

AD-634 028 **Field 2F, 4B**
CFSTI Prices: HC$1.00 MF$0.50
Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.

MONTHLY FIRE BEHAVIOR PATTERNS,
by Mark J. Schroeder, and Craig C. Chandler. 1966, 17p PSW-112
Contract OCD-PS-65-27

Descriptors: (*Climatology, *Forest fires), Probability, Maps, Data, Forestry.

From tabulated frequency distributions of fire danger indexes for a nationwide network of 89 stations, the probabilities of four types of fire behavior ranging from 'fire out' to 'critical' were calculated for each month and are shown in map form. (Author)

PB-169 722 See Field 5C

PB-169 736 See Field 5C

3A. ASTRONOMY

N66-21440 Field 3A
CFSTI Prices: HC$6.00 MF$1.25
American Science and Engineering, Inc., Cambridge, Mass.
SURVEY OF EXTRATERRESTRIAL NON-SOLAR X-RADIATION BY ROCKET BORNE INSTRUMENTS.
Final rept.,
by R. Giacconi, J. R. Waters, and H. Gursky. 1966, 214p ASE-2017
Contract NASW-898
NASA CR-71522

Descriptors: *Aerobee rocket, *Rocket measurement, *Space radiation, *X-ray.

N66-22167 Field 3A
CFSTI Prices: HC$3.00 MF$0.75
Maryland Univ., College Park. Dept. of Physics and Astronomy.
STUDIES IN THE 11 METER RANGE OF RADIO ASTRONOMY USING HIGH RESOLUTION AND HIGH SENSITIVITY ANTENNA ARRAYS AT CLARK LAKE.
Final rept.,
by W. C. Erickson. 1965, 66p
Grant NsG-615
NASA CR-71421

Descriptors: *Astronomy, *Lunar occultation, *Radio star signal, *Crab nebula, *Planetary nebula, *Radio interferometer, *Solar radio burst, *Star tracking, *Tau star.

N66-22175 Field 3A
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE POSSIBILITY OF RADIO NOISE FROM THE LUNAR RED SPOTS,
by J. A. Okeefe. 1964, 4p NASA-TM-X-56088

Descriptors: *Electric discharge, *Lunar crater, *Selenology, *Static electricity, *Radio noise.

N66-22243 Field 3A
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ASTRONOMICAL ULTRAVIOLET RADIATION,
by K. L. Hallam. Mar 65, 40p Rept. no. X-614-65-106, NASA-TM-X-56421

Descriptors: *Space radiation, *Stellar radiation, *Ultraviolet radiation, *Galactic radiation, *Interstellar radiation.

AD-633 953 See Field 22A

3B. ASTROPHYSICS

AD-633 477 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Center for Radiophysics and Space Research, Cornell Univ., Ithaca, N. Y.
MEASUREMENT OF SOLAR RADIATION AT 430 MEGACYCLES.
Quarterly status rept. 1 Aug 65-30 Apr 66,
by Marshall H. Cohen. May 66, 8p CRSR-238
Contract Nonr-401 (27)

Descriptors: (*Radio astronomy, *Solar radiation), Solar disturbances, Extraterrestrial radio waves, Ultrahigh frequency, Scintillation, Data processing systems, Digital computers, Astrophysics.

AD-633 784 Field 3B, 22A
CFSTI Prices: HC$2.00 MF$0.50
Office of the Chief of Engineers (Army), Washington, D. C.
LUNAR DEVELOPMENT HISTORY AND ITS ENGINEERING IMPLICATIONS.
Final rept. Jun 64-Jul 65,
by Bruce M. Hall. Jun 66, 44p TN-66-201
Proj. DA-4A025001A890

Descriptors: (*Moon, *Engineering geology), (*Lunar probes, Engineering geology), Photogeology, Extraterrestrial topography, Astrophysics.

Identifiers: Selenology.

Observed data and current theories were studied to explain the selenologic character and engineering properties of the lunar surface. Formation of the moon by accretion of cold particles, followed by internal heating, complete melting, magmatic differentiation and planetary cooling and degassing is postulated. Principal lunar surface features resulted from infall of space debris, magma flows, crustal deformation and surface erosion by sputtering, meteoroid impact and ejecta from primary impacts. Evidence is presented to support the hypothesis. Engineering properties of the lunar surface are postulated for an average marial topographic province. The lunar surface is composed principally of granular material varying as to granular gradation. Soil bearing strength, compaction, adhesion, excavation procedures, trafficability, dust propogation and surface temperatures are considered. Similar engineering data for the highlands may not be induced at this time because of their more heterogeneous character. (Author)

AD-633 999 Field 3B, 22A, 22C
CFSTI Prices: HC$1.60 MF$0.50
RAND Corp., Santa Monica, Calif.
ENGINEERING MODEL ATMOSPHERE OF MARS,
by Gerhard F. Schilling. Sep 62, 18p P-2639
Prepared for presentation at AFOSR-GE Symposium on Dynamics of Manned Lifting Planetary Entry, Philadelphia, October 29-31, 1962.

Descriptors: (*Mars (Planet), *Atmosphere models), (*Mars probes, Atmosphere models), Planetary atmospheres, Atmosphere entry, Mathematical models, Astrophysics, Astronautics.

The planning of the exploration of Mars by means of space vehicles imposes demands on our knowledge of the atmosphere of Mars which go beyond the concepts of 'best values' or 'most likely conditions.' In view of the present scarcity of reliable data, a theoretical model of the Martian atmosphere is offered here which instead gives the limiting conditions to be encountered. This model atmosphere gives extreme upper and lower probable limits of pressure, temperature, and density up to 150 km altitude over middle and low latitudes, independent of time of day or season. In addition, a number of parameters are tabulated which are of concern for the engineering design of entry probes. The mathematical method was based on the present factual knowledge with a minimum of assumptions and has therefore yielded results on a rather high confidence level. This has been achieved in part through an extremely wide spread of values. Nevertheless, a combination of circumstances makes it apparent that the engineering task of atmospheric entry will be easier for the Martian atmosphere than for the atmosphere of any other planet in our solar system. It can safely be concluded that Mars will be the first planet inviting manned exploration from an engineering as well as scientific point of view. (Author)

AD-634 082 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Travelers Research Center, Inc., Hartford, Conn.
SOLAR FLARE OCCURRENCE AS A FUNCTION OF SUNSPOT SIZE.
Interim scientific rept., Air Force Surveys in geophysics,
by Isadore Enger, Ronald T. Podsiadlo, Delos C. Jensen, and Fred Ward. Apr 66, 25p
Contract AF 19 (628)-5129,
Proj. AF-86666,
Task 866601
AFCRL AFSIG-178, AFCRL 66-293
Prepared in cooperation with Det. 54, 6th Weather Wing, Air Weather Service.

Descriptors: (*Solar flares, *Sunspots), Astronomical data, Correlation techniques, Astrophysics.

An objective technique has been developed for assessing the probability of occurrence of solar flares in a particular sunspot group, given only the sizes of the sunspot group on two consecutive days. The sunspot data cover the 10-year period 1955 to 1964 and have been published in the Greenwich Photoheliographic Results. The flare data were measured at Sacramento Peak, New Mexico. The flare and spot data were combined by a simple, objective technique which depends only on the size of the spot group and the relative positions of the spot group and flare. These results show the very marked dependence of flare occurrence on the size of the spot group and a significant, but very much smaller, dependence on the change in group size from one day to the next. (Author)

N66-21229 Field 3B
CFSTI Prices: HC$2.00 MF$0.50
National Bureau of Standards, Washington, D. C.
THERMODYNAMIC EQUILIBRIA IN PLANETARY ATMOSPHERES,
by M. O. Dayhoff, E. R. Lippincott, R. V. Eck, and C. Sagan. 1965, 38p
Grant NGR-21-003-002
NASA CR-69829
Prepared in cooperation with Maryland Univ., College Park, Harvard Univ., Cambridge, Mass.

Descriptors: *Planetary atmosphere, *Thermodynamic equilibrium.

N66-21349 Field 3B
CFSTI Prices: HC$4.00 MF$1.00
Geological Survey, Washington, D. C.
ASTROGEOLOGIC STUDIES. PART C. COSMIC CHEMISTRY AND PETROLOGY.
Annual progress rept. no. 6, 1 Jul 64-1 Jul 65. Nov 65, 124p
NASA Order-R-66
NASA CR-71413

Descriptors: *Achondrite, *Electron microscope, *Geochemistry, *Meteoritic composition, *Petrology, *Tektite.

N66-21350 Field 3B
CFSTI Prices: HC$4.00 MF$1.00
Geological Survey, Washington, D. C.
ASTROGEOLOGIC STUDIES. PART A. LUNAR AND PLANETARY INVESTIGATIONS.
Annual progress rept. no. 6, 1 Jul 64-1 Jul 65. Nov 65, 131p
NASA Order-R-66
NASA CR-71414

Descriptors: *Geology, *Lunar surface, *Stratigraphy, *Mapping.

N66-21352 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Boston Univ., Mass.
AN INVESTIGATION OF SCHROTER'S RULE.
Research rept. no. 17,
by W. J. Abrams. Jan 66, 20p
Grant NsG-246-62
NASA CR-71416

Descriptors: *Cratering, *Lunar crater.

N66-21353 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
WAKE OF THE MOON,
by D. P. Hoult. 1965, 22p
Grant NsG-134
NASA CR-71417

Descriptors: *Lunar magnetic field, *Solar wind, *Wake.

N66-21635 Field 3B
CFSTI Prices: HC$2.00 MF$0.50
Geological Survey, Washington, D. C.
ASTROGEOLOGIC STUDIES.
Annual summary progress rept., 1 Jul 64-1 Jul 65. Nov 65, 34p
NASA Order-R-66
NASA CR-71419

Descriptors: *Cratering, *Extraterrestrial matter, *Mapping, *Geology, *Lunar surface, *Petrology.

N66-21679 Field 3B
CFSTI Prices: HC$3.00 MF$0.75
Harvard Coll. Observatory, Cambridge, Mass.
MODELS OF THE LUNAR SURFACE INCLUDING TEMPERATURE-DEPENDENT THERMAL PROPERTIES,
by J. L. Linsky. 15 Jan 66, 90p Scientific-8
Grant NsG-64-60
NASA CR-71554

Descriptors: *Heat equation, *Thermal property, *Lunar surface, *Radiative heat transfer, *Surface temperature.

N66-21726 Field 3B
CFSTI Prices: HC$9.97 MF$3.25
Texas Instruments, Inc., Dallas. Science Services Div.
SURVEY OF LUNAR SURFACE MEASUREMENTS, EXPERIMENTS AND GEOLOGIC STUDIES.
Final rept.
30 Aug 64, 697p
Contract NAS9-2115
NASA CR-65313

Descriptors: *Apollo project, *Lunar landing, *Manned spacecraft, *Surface property.

N66-21767 Field 3B
CFSTI Prices: HC$3.00 MF$0.75
GCA Technology Div., GCA Corp., Bedford, Mass.
CONTRIBUTIONS TO PLANETARY METEOROLOGY.
Final rept.,
by F. B. House, G. Ohring, J. Mariano, and W. Tang. Mar 66, 87p GCA-TR-66-8-N
Contract NASw-1227
NASA CR-71627

Descriptors: *Climatology, *Mars atmosphere, *Atmospheric circulation, *Meteorology, *Planetary atmosphere, *Venus atmosphere.

N66-21782 Field 3B
CFSTI Prices: HC$4.00 MF$0.75
Boston Univ., Mass.
CATALOGUE OF LUNAR CRATERS CROSS SECTIONS. I. CRATERS WITH PEAKS,
by G. S. Hawkins, W. H. Zack, and S. M. Saslow. Sep 65, 115p Research rept. RR-16, Astro-Contrib-Ser-11-41
Grant NsG-246-62
NASA CR-71543

Descriptors: *Lunar crater, *Selenography, *Table.

N66-22217 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
GRAVITATIONAL RADIATION FROM A SPINNING ELLIPSOID OF UNIFORM DENSITY,
by C.-W. Chin. 26 Mar 65, 10p NASA-TM-X-56447

Descriptors: *Energy loss, *Astrophysics, *Gravitational radiation, *Neutron star.

N66-22218 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
THE GREENHOUSE EFFECT IN A GRAY PLANETARY ATMOSPHERE,
by R. Wilot. 3 Jun 65, 16p NASA-TM-X-56621

Descriptors: *Planetary atmosphere, *Gray gas, *Greenhouse effect.

N66-22235 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
TEKTITES AS A GUIDE TO THE STRUCTURE OF THE MOON,
by P. D. Lowman Jr., and J. A. Okeefe. 1965, 20p NASA-TM-X-56663

Descriptors: *Lunar composition, *Moon, *Tektite.

N66-22239 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
OBSERVED ULTRAVIOLET REFLECTIVITY OF MARS,
by D. C. Evans. 1965, 18p NASA-TM-X-56654

Descriptors: *Mars (Planet), *Planetary atmosphere, *Ultraviolet spectroscopy.

N66-22241 Field 3B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
ON GRAPHITE AND INTERSTELLAR EXTINCTION,
by B. Donn, and T. P. Stecher. 1965, 5p NASA-TM-X-56630

Descriptors: *Light scattering, *Graphite, *Interstellar material, *Light absorption.

N66-22260 Field 3B
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
EXTENSION OF THE PHOTOSPHERIC MAGNETIC FIELD INTO INTERPLANETARY SPACE,
by N. F. Ness, and J. M. Wilcox. Feb 65, 36p Rept. no. X-612-65-79, NASA-TM-X-56170
Prepared in cooperation with California Univ., Berkeley.

Descriptors: *Solar magnetic field, *Interplanetary space, *Magnetic field, *Magnetohydrodynamics, *Photosphere.

PB-169 976 Field 3B
CFSTI Price: HC$5.60
Ohio State Univ. Research Foundation, Columbus.
NATURAL ENVIRONMENT OF THE PLANET MARS,
by J. H. Shaw, Feb 59, 60p Phase tech. note 847-1
Contract AF 33 (616)-5914,
Task 11115
AD 242 175

Descriptors: (*Mars, Astrophysics), Planetary atmospheres.

This report summarizes present knowledge and speculations concerning the planet Mars: The report is divided into a number of sections; in each of which current information, theories, and speculations of one aspect of the environment are evaluated. Extensive references are given at the end of each section.

AD-633 962 See Field 22A

AD-633 996 See Field 22B

4A. ATMOSPHERIC PHYSICS

NBS-TN-18-24 Field 4A, 20N
CFSTI Prices: HC$0.50 MF$0.75
Central Radio Propagation Lab., Boulder, Colo.
QUARTERLY RADIO NOISE DATA: SEPTEMBER, OCTOBER, NOVEMBER, 1964.
Technical note,
by W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. 10 Feb 66, 90p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.50. See also C.13.46-18-23.

Descriptors: (*Noise (Radio), Measurement), Tables.

NBS-TN-18-25 Field 4A, 20N
CFSTI Prices: HC$0.40 MF$0.50
Central Radio Propagation Lab., Boulder, Colo.
QUARTERLY RADIO NOISE DATA: DECEMBER, JANUARY, FEBRUARY 1964-65,
by W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. 14 Mar 66, 61p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.40. See also NBS-TN-18-24.

Descriptors: (*Noise (Radio), Measurement), Tables.

N66-21815 Field 4A
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Dept. of Meteorology and Oceanography.
EQUILIBRIUM TEMPERATURE STRUCTURE IN THE MESOSPHERE AND LOWER THERMOSPHERE,
by J. S. Hogan, and C. Prabhakara. Jan 66, 44p
TR-66-1
Grant NsG-499
NASA CR-71535

Descriptors: *Thermosphere, *Equilibrium, *Mesosphere, *Radiative heat transfer.

N66-21816 Field 4A
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
MEASUREMENT OF ELECTRON CONTENT AT THE MAGNETIC EQUATOR,
by W. J. Ross. 30 Mar 66, 35p Scientific-268
Grant NsG-114-61
NASA CR-71536

Descriptors: *Beacon satellite, *Ionospheric electron density, *Magnetic equator, *Faraday rotation, *Radio beacon.

N66-22202 Field 4A
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
PHOTOGRAPHIC OBSERVATIONS OF NIGHTGLOW FROM ROCKETS,
by L. Dunkelman, and J. Hennes. 28 Jul 65, 11p
NASA-TM-X-56664

Descriptors: *Aerobee rocket, *Airglow, *Rocket photography.

N66-22215 Field 4A
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
ANALYTIC REPRESENTATION OF UPPER ATMOSPHERE DENSITIES BASED ON JACCHIA'S STATIC DIFFUSION MODELS,
by J. C. G. Walker. 1965, 8p NASA-TM-X-56450

Descriptors: *Mathematical model, *Satellite drag, *Upper atmosphere.

N66-22221 Field 4A
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
EARLY ELECTROSTATIC PROBE RESULTS FROM EXPLORER XXII,
by L. H. Brace, and B. M. Reddy. 1965, 27p
NASA-TM-X-56632

Descriptors: *Diurnal variation, *Electron temperature, *Explorer XXII satellite, *Ionosphere.

N66-22351 Field 4A
CFSTI Prices: HC$3.00 MF$0.75
LTV Aerospace Corp., Dallas, Tex. LTV Astronautics Div.
ANALYSIS OF POLAR CAP ABSORPTION EVENTS. I. EFFECT OF SOLAR AND SOLAR INDUCED CONDITIONS PRIOR TO THE PCA EVENTS.
Final rept.,
by F. C. Jonah. 17 Dec 65, 89p Rept. no. 00.740
Contract NAS9-4911
NASA CR-65323

Descriptors: *Polar cap absorption, *Proton, *Radiation intensity, *Solar flare.

PB-170 548 Field 4A, 20H
CFSTI Prices: HC$6.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
RAYONNEMENT GAMMA DANS L'ESPACE ET DANS L'ATMOSPHERE (Gamma Radiation in Space and in the Atmosphere).
Doctoral thesis in French,
by Robert Rocchia. 1966, 65p CEA-R-2939
Text in French; Attached summary in English.

Descriptors: (*Gamma rays, Space environmental conditions), (*Atmosphere, Gamma rays), (*Astrophysics, Gamma rays), Bremsstrahlung, Electrons, Positrons, Compton scattering, Charged particles, France.

The gamma radiation existing in the atmosphere is shown to be caused mainly by the bremsstrahlung of the electrons of the electromagnetic cascades (about 50 per cent of the measured radiation), by the 511 keV radiation produced by the annihilation of positrons created in cascades (8 per cent of the measured intensity) and by the Compton gamma degradation of this line (30 per cent of the measured intensity). The rest, slightly over 10 per cent, must be attributed to secondary causes such as the nuclear de-excitation gamma to the internal bremsstrahlung of charged particles created in nuclear stars, and to charged particles crossing the detector, since the latter was not fitted with a device for rejecting these particles. Experiments carried out in rockets at Colomb-Bechar confirm these results and have made it possible to detect and measure a primary gamma radiation having an intensity of about 2 gamma/sq cm/sec above 100 keV. The primary spectrum obeys an approximate E (-2) law. (Author)

AD-454 078 See Field 1A

AD-633 539 See Field 8L

NBS-TN-332 See Field 7D

4B. METEOROLOGY

AD-410 578 Field 4B
CFSTI Price: HC$1.60
Colorado State Univ., Fort Collins, Dept. of Atmospheric Sciences.
CUMULUS CONVECTION AND OROGRAPHIC CONVECTION CELLS.
Technical rept. no. 2, 1 Dec 62-31 May 63,
by Herbert Riehl. 31 May 63, 14p
Contract DA-36-039-sc-89080,
Proj. DA-3A99-27-005-09

Descriptors: (*Cumulus clouds, Convection), (*Storms, Rainfall), (*Meteorological phenomena, Tropical regions), Periodic variations, Clouds, Meteorological radar, Meteorological satellites, Wind, Tables, Weather stations.

Initial research in regard to Southeast Asia regions is described under three topics: (1) dynamics and energetics of stationary monsoon systems; (2) day-to-day variations in the Asiatic summer monsoon season; and (3) onset of the Asiatic summer monsoon. Daily variations of wind structure, rainfall, etc. in the Asiatic summer monsoon season are superimposed on a very strong quasi-stationary circulation which is much more persistent than found, for instance, in the Atlantic or Pacific trade regions. Tentative calendar dates for the commencement of the SW monsoon for several pilot balloon stations in Southeast Asia were determined for the years 1936-1941, inclusive. (Author)

AD-633 584 Field 4B, 20D, 14B
CFSTI Prices: HC$4.00 MF$0.75
Colorado State Univ., Fort Collins. Fluid Dynamics and Diffusion Lab.
SIMULATION OF ATMOSPHERIC MOTION BY WIND-TUNNEL FLOWS.
Technical rept.,
by J. E. Cermak, V. A. Sandborn, E. J. Plate, G. H. Binder, andH. Chuang. May 66, 113p
CER66JEC-VAS-EJP-GJB-HC-RNM-SI17
Grant DA-AMC-28-043-G20

Descriptors: (*Atmospheric motion, Simulation), Wind tunnels, Fluid mechanics, Meteorology.

The objective of this study was to survey and compile information and experience obtained by the authors with respect to simulation of atmospheric motions by wind-tunnel flows. These notes are restricted to atmospheric phenomena in the lower 1000 m of the atmosphere as determined by the interests of the staff and the capabilities of the wind tunnels associated with the Fluid Dynamics and Diffusion Laboratory at Colorado State University. (Author)

AD-633 693 Field 4B, 16B, 19D
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
METEOROLOGICAL DATA REPORT, ATHENA FLIGHT NUMBER 041 (12 MAY 1966),
by Harold M. Richart. Jun 66, 38p DR-32
Task 1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Athena, Ballistic meteorology.

Meteorological data gathered for the launching of Athena Flight Number 041, Vehicle No. D-018 are presented for the Air Force Ballistic Missile Re-entry Systems Office and for ballistic studies. The data are presented in Tabular form. (Author)

AD-633 694 Field 4B
CFSTI Prices: HC$5.00 MF$1.00
Army Electronics Command, Fort Huachuca, Ariz. Research Div.
NUMERICAL SOLUTION OF THE TRANSPORT AND ENERGY EQUATIONS IN THE PLANETARY BOUNDARY LAYER.
Technical rept.,
by William D. Ohmstede. Apr 66, 156p
Task 1V0-14501-B53A-08
ECOM 6020

Descriptors: (*Atmosphere, Transport properties), (*Micrometeorology, *Mathematical models), Weather forecasting, Numerical analysis.

This report presents the development of an algorithm for the approximate prediction of the physical behavior of the planetary boundary layer. For the sake of brevity, the problem is restricted to one which displays most of the essential features involved. By means of various approximations, the problem is stated in mathematical terms. The behavior of the planetary boundary layer is described by a system of nonlinear partial differential equations of the parabolic type, and boundary conditions at the earth's surface are developed in terms of the energy balance principle. Through a priori analysis, it is inferred that the problem is well-posed. Various finite-difference operators are proposed and shown to be consistent with the differential operators. The boundedness and computational stability of the solutions of the finite-difference operators are discussed. It is concluded that the pure implicit nonlinear operator is the most satisfactory for the development of the algorithm. The algorithm is developed in detail and several solutions are presented to illustrate the results obtainable from it. (Author)

AD-633 737 Field 4B
CFSTI Prices: HC$2.00 MF$0.50
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
ASYMPTOTIC BEHAVIOR OF PLANETARY-SCALE MOTIONS OF THE ATMOSPHERE,
by G. K. Morikawa. Apr 66, 41p IMM-348
Contract Nonr-285 (55),
Proj. NR-062-160

Descriptors: (*Atmosphere, *Motion), Fluid mechanics, Approximation (Mathematics), Dynamics, Weather forecasting.

Asymptotic equations describing slowly varying planetary-scale motions of the atmosphere over the rotating earth are derived and compared to the geostrophic equations of motion in the tangent plane approximation. Since the same approximation procedure is used in both the spherical and plane geometry, a direct term by term comparison is possible. The plane approximation yields familiar prognostic equations (initial value problem); but in the more constrained spherical geometry, a more restricted forcing-type problem results if the zonal motion is time-dependent. That is, with a given slowly varying or steady zonal motion, is associated a class of long-wave tesseral motions, i.e. coupled low-wave-number and meridional motions. (Author)

AD-633 779 Field 4B, 16B, 19D
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

NIKE-APACHE STV (SR-027) (21 APRIL 1966) AND NIKE-APACHE STV (SR-028) (21 APRIL 1966).
Meteorological data rept.,
by Len E. Carter, and Stan F. Kubinski. May 66, 31p DR-13
Task DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Nike-Apache, Ballistic meteorology.

Meteorological data gathered for the launching of Nike-Apache STV (SR-027) and Nike-Apache STV (SR-028) are presented for the Ballistic Systems Division, U. S. Air Force, and for future ballistic studies. The meteorological data and resulting ballistic data appear in tabular form. (Author)

AD-633 797 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
AEROBEE NASA 4.106 NP 9 MAY 1966).
Meteorological data rept.,
by Marjorie McLardie Hoidale. May 66, 31p DR-30
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Aerobee, Ballistic meteorology.

Meteorological data gathered for the launching of Aerobee NASA 4.106 NP are presented for the National Aeronautics and Space Administration, the Jet Propulsion Laboratory, and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form. (Author)

AD-633 798 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
NIKE-CAJUN NICAP/1, ROUND NO. 026 (22 APRIL 1966).
Meteorological data rept.,
by Harold M. Richart. May 66, 30p DR-16
Task DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Nike-Cajun, Ballistic meteorology.

Meteorological data gathered for the launching of Nike-Cajun NICAP/1, Round Number 026, are presented for the U. S. Army Electronics Command, Fort Monmouth, New Jersey, and for future ballistic studies. The meteorological data and resulting ballistic data appear in tabular form. (Author)

AD-633 799 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
NIKE-APACHE STV (SR-029) (2 MAY 1966) AND NIKE-APACHE STV (SR-030) (2 MAY 1966).
Meterological data rept.,
by Gordon L. Dunaway. May 66, 42p DR-18
Task DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Nike-Apache, Ballistic meteorology.

Meteorological data gathered for the launching of Nike-Apache STV (SR-029) and Nike-Apache STV (SR-030) are presented for the Ballistic Systems Division, U. S. Air Force, and for future ballistic studies. The meteorological data and resulting ballistic data appear in tabular form. (Author)

AD-633 889 **Field 4B, 16B, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
HONEST JOHN MISSILE NO. 1764, ROUND NO. 518 RML (7 APRIL 1966).
Meteorological data rept.
May 66, 20p DR-22
Proj. DA-1V650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Honest John, Ballistic meteorology.

Meteorological data gathered for the launching of Honest John, Missile Number 1964, Round Number 518 RML, are presented in tabular form. (Author)

AD-633 918 **Field 4B, 14B**
CFSTI Prices: HC$5.00 MF$1.00
Thornthwaite (C. W.) Associates, Elmer, N. J. Lab. of Climatology.
DEVELOPMENTS IN METEOROLOGICAL SENSORS AND MEASURING TECHNIQUES TO 150,000 FEET, 1965.
Final rept.,
by Richard T. Field, F. Kenneth Hare, John R. Mather, andGary A. Yoshioka. 30 Apr 66, 171p
Contract DA-28-043-AMC-01248 (E),
Proj. DA-1V0-14501-B-53A-02
ECOM 01248-F

Descriptors: (*Meteorological instruments, State-of-the-art reviews), (*Atmospheric sounding, Meteorological instruments), Upper atmosphere, Meteorological parameters, Probes, Bibliographies.

Results of á continuing survey of recent developments in meteorological sensors and measuring techniques for measuring temperature, wind, humidity, radiation (solar and terrestrial), density, pressure, and ozone from the surface up to 150,000 feet are presented as an annotated bibliography of 230 items plus an analysis of the current state-of-the-art and a discussion of promising developments. The report also includes an introduction on the meteorological characteristics and therefore instrumental needs in the stratosphere. The text includes 104 references. (Author)

AD-633 920 **Field 4B, 14B**
CFSTI Prices: HC$3.00 MF$0.50
GCA Technology Div., GCA Corp., Bedford, Mass.
HIGH ALTITUDE GUN PROBES (DEVELOPMENT OF LANGMUIR PROBES).
Final rept.,
by A. V. Block, A. L. Kadis, and L. C. Smith. Sep 65, 68p GCA-TR-65-15-G
Contract DA-19-020-AMC-00292 (R)

Descriptors: (*Langmuir probes, *Atmospheric sounding), (*Electron density, *Ionosphere), High altitude, Probes (Electromagnetic), Gun launched, Electronic equipment, Specifications, Flight tests, Performance (Engineering).

This final report describes a program to develop an instrument capable of measuring electron density in the 50 to 160 kilometer altitude region and capable of surviving a 60,000 'G' shock encountered during launch from a cannon. This report is in two parts: The first describes various techniques and instruments capable of measuring electron density in this altitude region. The second section describes the design techniques as well as flight results from these probes. Both dc and ac Langmuir probes were chosen as the best instruments for fulfilling the system requirements. (Author)

AD-634 065 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
AEROBEE NASA 4.51 UG (23 MAY 1966).
Meteorological data rept.,
by Gordon L. Dunaway. Jun 66, 31p DR-36
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Aerobee, Ballistic meteorology.

Meteorological data gathered for the launching of Aerobee NASA 4.51 UG are presented for the National Aeronautics and Space Administration, Princeton University and for ballistic studies. The data appear, along with calculated ballistic data, in tabular form. (Author)

AD-634 066 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
NIKE-APACHE STV (SR-031) (24 MAY 1966).
Meteorological data rept.,
by Gordon L. Dunaway. Jun 66, 30p DR-37
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Nike-Apache, Ballistic meteorology.

Meteorological data collected for the launching of Nike-Apache STV (SR-031) are presented for the Ballistic Systems Division, U. S. Air Force, and for future ballistic studies. The meteorological data and resulting ballistic data appear in tabular form. (Author)

AD-634 067 **Field 4B, 16B, 19D**
CFSTI Prices: HC$2.00 MF$0.50
Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
396 LANCE MISSILE NO. 028, ROUND NO. 19 RSL (29 APRIL 1966).
Meteorological data rept.
Jun 66, 36p DR-27
Task IV650212A127-02

Descriptors: (*Meteorology, Guided missile ranges), (*Ballistics, Meteorology), (*Atmospheric sounding, Guided missile ranges), Meteorological parameters, Rocket trajectories, Impact prediction, Rocket research, Launching, Test facilities, New Mexico.

Identifiers: Lance (Missile), Ballistic meteorology.

Meteorological data gathered for the launching of 396 Lance, Missile Number 028, Round Number 19 RSL, are presented in tabular form. (Author)

AD-634 095 **Field 4B, 6F, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Wisconsin Univ., Madison. Dept. of Meteorology.
AIRMASSES, STREAMLINES, AND THE BOREAL FOREST. APPENDIX: NON-LINEAR PARAMETER ESTIMATION FOR THE PARTIAL COLLECTIVE MODEL OF AIRMASS ANALYSIS.
Technical rept.,
by Reid A. Bryson, and Donald R. Johnson. Feb 66, 81p TR-24
Contract Nonr-1202 (07), Grant NSF-GP-444, Proj. NR-387-022

Descriptors: (*Climatology, *Ecology), (*Air mass analysis, Climatology), Geography, Canada, Plants (Botany), Meteorological parameters, Correlation techniques, Arctic regions.

Identifiers: Boreal forest.

The July airmass frequency distribution over Canada is analyzed by daily computation of trajectories from grid intersections back to source regions. A zone of rapid transition from Arctic Air dominance to Pacific Air dominance is found to lie along the northern border of the boreal forest, suggesting that the summer airmass distribution might be an important causal factor for the distribution of forest versus tundra. An independent analysis of July airmass frequency distribution by resolution of the daily maximum temperature frequency distribution into partial collectives (component normal distributions) yields results very similar to the trajectory analysis but with more detail. This analysis suggests that airmass dominance might be of importance to other biotic regions as well as the boreal forest and tundra. A final analysis using monthly resultant wind streamlines near the surface indicates that mean airstreams and confluences between airstreams define climatic regions with a distinctive annual march of airstream (and in the mean, airmass) dominance. These regions show a clear congruence with several major biotic regions. These analyses strongly suggest that the boreal forest occupies the region between the mean (or modal) southern boundary of Arctic Air in winter and the mean southern boundary of Arctic Air in summer. (Author)

N66-21657 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Research Lab. of Electronics.
SENSING OF METEOROLOGICAL VARIABLES BY LASER PROBE TECHNIQUES.
Semiannual rept., 1 Aug 65-31 Jan 66,
by G. Fiocco. 1 Feb 66, 7p
Grant NGR-22-009-131
NASA CR-71397

Descriptors: *Laser output, *Meteorological probe, *Optical radar.

N66-22200 **Field 4B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE INTERPRETATION OF TIROS RADIATION DATA FOR PRACTICAL USE IN SYNOPTIC WEATHER ANALYSIS,
by L. J. Allison, and G. Warnecke. 1965, 49p
NASA-TM-X-56514

Descriptors: *Meteorological satellite, *Radiation, *Tiros III satellite.

N66-22212 **Field 4B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
SATELLITE METEOROLOGY,
by S. I. Rasool. 1965, 16p NASA-TM-X-56624

Descriptors: *Meteorology, *Nimbus satellite, *Satellite observation, *Tiros satellite, *Weather.

PB-169 322 **Field 4B, 22B, 9E**
CFSTI Prices: HC$6.60 MF$0.75
Aracon Labs., Concord, Mass.
NIMBUS DISPLAY SUBSYSTEMS FOR VIDICON ERROR REMOVAL, ATTITUDE DETERMINATION AND METEOROLOGICAL EDITING.
Final rept.,
by R. B. Bartlett, and J. Greaves. 31 Jan 63, 66p
ARA-1098
Contract Cwb-10489

Descriptors: (*Meteorological satellites, Display systems), (*Television display systems, Meteorological satellites), Vidicons, Horizon scanners, Errors, Images, Distortion, Meteorological charts, Photographic images, Cloud cover, Attitude indicators, Photogrammetry, Computers, Maps.

Identifiers: Nimbus.

Electronic non-linearities in the vidicon can cause error in the geographic referencing of cloud elements in Nimbus television pictures. A second source of error may be realized due to horizon sensor inaccuracy. The report contains a description of an equipment configuration for measurement of fiducial marks, landmarks and cloud match points in Nimbus Advanced Vidicon Camera System (AVCS) pictures. The location and spacing of the fiducial marks in the pictures is used to remove electronic distortions and translations occurring in the cloud cover photographs. A method is detailed for determination of satellite attitude by photogrammetric techniques for photographs in which recognizable landmarks occur. For pictures in which no landmarks are available attitude is determined by the measurement of common 'points' appearing in sequence of pictures which includes at least one frame with usable landmarks. A second equipment configuration is described for the display and editing of computer generated cloud cover mosaic maps. The editing consists of replacement of incorrect mosaic elements as well as the introduction of lines and words in the picture. (Author)

PB-169 608 **Field 4B, 8L**
CFSTI Prices: HC$1.60 MF$0.50
Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.
CHARACTERISTICS OF SILVER IODIDE ICE NUCLEI ORIGINATING FROM ANHYDROUS AMMONIA-SILVER IODIDE COMPLEXES. PART I,
by R. L. Steele, and F. W. Krebs. Jan 66, 13p
Technical paper nos. TP-73, TP-66-1
Grant NSF-GP-1663
Prepared in cooperation with DuPont de Nemours (E. I.) and Co. Inc., Wilmington, Del. Development Dept.

Descriptors: (*Ice, Nucleation), (*Nucleation, Ice), (*Silver compounds, Iodides), Artificial precipitation, Cloud chambers, Ammonia, Sprays, Aerosols, Complex compounds, Filters (Fluid), Impurities, Microstructure, Thermodynamics.

Identifiers: Silver iodide.

Two methods of generating silver iodide ice nuclei were investigated. Neither employs thermal processing. A 3000 liter isothermal cloud chamber controllable over the range of 0 to -200 plus or minus 0.1 C was designed and fabricated to study nucleation processes along with other support equipment. Anhydrous ammonia as the AgI carrier was employed. In a simple system in which the complex is sprayed into ambient air via a commercial nozzle the results are negative, 10 to the 12th power nuclei per gram at -20C. Another system, using Dautrebande's principle of obligatory filtration, shows promise. Performance at-13C is 3 x 10 to the 14th power nuclei per gram. The electron microscope was used to study the effluents from both generators. The shape and physical characteristics of effective particles are quite different from those found in thermal generators. The marked difference in effectiveness between thermal and nonthermal systems is attributed to impurities. (Author)

PB-169 804 **Field 4B**
CFSTI Price: HC$20.30
Air Force Cambridge Research Center, Bedford, Mass. Geophysics Research Directorate.
THE PRACTICAL ASPECT OF TROPICAL METEOROLOGY.
Surveys in Geophysics,
by C. E. Palmer, C. W. Wise, L. J. Stempson, andG. H. Duncan. Sep 55, 207p AFCRC-SIG-76
AFCRC TN-55-220; AD 106 017

Descriptors: (*Meteorology, Tropical regions), (*Tropical regions, Meteorology), Climatology, Wind, Tropical cyclones.

The report is in seven parts. After a short introduction, the manner in which the tropical forecaster may utilize climatological information is discussed. The next section emphasizes that the approach to the evaluation of tropical data is different from that which is standard in high latitude meteorology. Then follows a long discussion of wind analysis, using streamlines and isotachs. The fifth section covers methods of analyzing cloud and weather distribution; the methods outlined here are designed specifically for use in tropical regions. The sixth section deals with problems of correlation of wind and weather patterns, of continuity and with related topics; the material is presented chiefly in the form of practical examples. Finally, the structure, genesis and movement of tropical cyclones are briefly discussed. (Author)

AD-633 775 **See Field 9C**

AD-633 841 **See Field 8M**

AD-633 899 **See Field 8L**

AD-634 028 **See Field 2F**

AD-634 097 **See Field 8F**

PB-169 054 **See Field 17B**

5A. ADMINISTRATION AND MANAGEMENT

AD-474 018 **Field 5A**
CFSTI Prices: HC$3.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge.
A HEURISTIC APPROACH TO ALTERNATE ROUTING IN A JOB SHOP.
Bachelor's thesis and Master's thesis,
by Francis John Russo. Jun 65, 52p MAC-TR-19
Contract Nonr-4102 (01),
Proj. NR-048-189

Descriptors: (*Scheduling, *Job analysis), Management engineering, Simulation, Digital computers, Queueing theory.

Identifiers: Theses.

The research reported investigates the use of heuristics for selecting from several alternate routes, resulting from partially-ordered tasks in a job-shop order file. The experimental vehicle employed was digital simulation on the Project MAC Compatible Time-Sharing System. The methodology was to conduct two passes of simulated shop runs. The first, with two artificially high levels of alternate

incidence, tested the efficiency of five different alternate routing heuristics in reducing mean tardiness. The second pass consisted of runs with the best heuristic developed during the first experimental phase, applied to a realistic length and frequency of alternate strings. The performance characteristics of the different heuristics are discussed at length. In addition, some implications are drawn of the computational nature of alternate routing and the difficulties encountered in implementing alternate routing heuristics at operation time. (Author)

AD-633 910 **Field 5A, 9B, 5I**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
INDEX OF PUBLISHED PAPERS.
Professional paper,
by C. G. Lambert. 15 Apr 66, 43p SP-0/000/04A
Modifies SP-0/000/04 (AD-615 730).

Descriptors: (*Indexes, Scientific research), (*Scientific research, Bibliographies), Reports, Subject indexing, Computers, Documentation, Education, Psychology, Language, Personnel management.

The report adds new information concerning papers listed in SP-0/000/04, and lists all new publications published since 1 May 1965. (Author)

AD-633 939 **Field 5A**
CFSTI Prices: HC$1.00 MF$0.50
Rand Corp., Santa Monica, Calif.
TOWARDS AN IMPROVED BASIS OF ESTIMATING AND CONTROLLING R AND D TASKS,
by Lawrence S. Hill. May 66, 20p P-3358
Prepared for presentation at the National Meeting of the American Association of Cost Engineers (10th) Philadelphia, Pa. Jun 1966.

Descriptors: (*Research program administration, *Management planning), (*Management control systems, Scientific research), Uncertainty, Feasibility studies.

AD-633 990 **Field 5A**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
MILESTONE REPORTING, MANAGEMENT BY EXCEPTION.
Technical memo.,
by R. C. Allen, and F. J. Gallagher. May 66, 36p MEL-TM-85/66

Descriptors: (*Management engineering, Reports), Management control systems, Records, Data, Marine engineering.

The program allows the Marine Engineering Laboratory management to monitor progress made in its Technical Assignments by providing an exception report of milestones missed. From this 'exception' type report, management may focus its attention on those particular projects which may require corrective action or assistance. (Author)

AD-634 001 **Field 5A, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Electronic Systems Div., L. G. Hanson Field, Mass. Technical Requirements and Standards Office.
SYNERGETIC MANAGEMENT OF COMPLEX MILITARY SYSTEMS,
by Milton V. Ratynski. May 66, 35p
ESD TR-66-281

Descriptors: (*Systems engineering, Air Force operations), (*Management engineering, Systems engineering), Operations research, Military organizations, Instruction manuals.

This paper highlights the organization of a creative technology--System Engineering Management. A new Air Force Systems Command Manual describes the importance of TOTAL SYSTEM DESIGN, in which it is recognized that the successful design of a complex military system is fundamentally dependent upon the complementary interplay between all the technical/ managerial/support specialists and disciplies. The procedures summarized herein are the engineering management standard for all future system acquisition programs and projects by the Air Force. (Author)

AD-633 578 **See Field 8A**

AD-633 898 **See Field 15E**

AD-633 908 **See Field 9B**

AD-634 069 **See Field 13B**

PB-169 966 **See Field 6E**

PB-170 051 **See Field 5C**

PB-170 333 **See Field 5C**

5B. DOCUMENTATION AND INFORMATION TECHNOLOGY

AD-633 614 **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
Dayton Univ., Ohio. Research Inst.
OPERATIONS OF A DOCUMENT RETRIEVAL SYSTEM USING A CONTROLLED VOCABULARY.
Final summary rept. 1 Dec 64-30 Nov 65,
by Edward A. Janning. Mar 66, 28p
Contract AF 33 (615)-1132,
Proj. AF-7381,
Task 738103
AFML TR-66-36

Descriptors: (*Information retrieval, Vocabulary), (*Vocabulary, Control), (*Subject indexing, Vocabulary), Reports, Search theory, Effectiveness.

Identifiers: Coordinate indexing.

The report describes the effects that a controlled vocabulary has on the indexing and searching operations of the document retrieval system established by the University of Dayton for the Air Force Materials Laboratory. The system contains about 30,000 scientific and technical reports covering all aspects of materials research and is controlled by a vocabulary of 10,000 terms. In general, the use of a controlled vocabulary has been found to be very beneficial to the overall operation of the system. Also described are three search strategies that are used to effectively retrieve information in a format that is more useful to a user than merely a list of document numbers. (Author)

NBS-TN-285 **Field 5B, 7B, 7C**
CFSTI Prices: HC$0.25 MF$0.50
National Bureau of Standards, Washington, D. C. Inst. for Applied Technology.
FILE ORGANIZATION FOR A LARGE CHEMICAL INFORMATION SYSTEM.
Technical note,
by Ruth Anderson, Ethel Marden, and Beatrice Marron. 18 Apr 66, 21p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.25.

Descriptors: (*Chemistry, Information retrieval), (*Information retrieval, Chemistry), (*Data processing systems, Chemistry), Data storage systems, Programming (Computers).

Identifiers: LISP.

The report describes a file structure which combines list-processing concepts (for handling variable length information records) with standard serial record arrangements (for identification information). The file organization was designed for a large chemical information system and includes both well-structured and unstructured (amorphous) information. An investigation was made of representative data inputs from the Department of the Army. The data to be put into the file, the nature of the file structure, and the necessary programs for manipulation of file information have been considered as interdependent parts of a total system. Computer programs have been initiated to test the validity of the proposed approach. (Author)

NP-15937 **Field 5B**
CFSTI Prices: HC$7.00 MF$1.75
Clearinghouse for Federal and Scientific Information, Springfield, Va.
INDEXING AND CLASSIFICATION, A SELECTED AND ANNOTATED BIBLIOGRAPHY,
by Winifred F. Desmond, and Lester A. Barrer. 14 May 66, 356p
Prepared in cooperation with American University, Washington, D. C.

Descriptors: (*Subject indexing, Bibliographies), (*Classification, Bibliographies), Documentation, Information retrieval, Indexes, Automation, Data processing systems.

The annotated bibliography emphasizes indexing and classification in documentation. Subjects covered include manual, mechanized and automated techniques, evaluation of systems, standards, storage and retrieval systems, research, vocabularies, author participation, permuted title indexing, citation indexing, specialized indexing requirements, i.e. chemistry, medicine, patents, engineering drawings, and computer-aided systems. The subject of abstracting is also covered. A total of 635 references, with coverage of the literature from 1960 to mid-1964, are presented from reports monographs, periodicals, conferences and other forms of literature. An analysis of the coverage is given. The bibliography is followed by a computer-produced title index (KWIC), author index and a manually selected subject index for comparison purposes. This bibliography introduces the newly formed Nuclear Science Division of the Special Libraries Association, which has sponsored the publication in cooperation with the Documentation Division of SLA. (Author)

N66-21675 **Field 5B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Washington, D. C.
NASA SPECIAL PUBLICATIONS, SPRING 1966 BIBLIOGRAPHY.
1966, 41p NASA-TM-X-57334

Descriptors: *Space science, *Aerospace technology, *Bibliography.

PB-170 501 **Field 5B**
CFSTI Prices: HC$14.80 MF$1.00
Naval Postgraduate School, Monterey, Calif.
SUBJECT LIST OF PERIODICALS AND JOURNALS.
Mar 66, 152p
NSF Scientific Documentation Project.

Descriptors: (*Navy, Education), (*Libraries, Periodicals), (*Periodicals, Classification).

The list of periodicals, arranged according to major subject fields, represents the holdings and current subscriptions available in the Library of the United States Naval Postgraduate School. An alphabetically arranged list has previously been published. The information following each title shows the volumes and dates of the holdings of that title. A '+' indicates that the title is being received currently. When a journal covers several fields, it will be listed under each of the pertinent subject areas.

AD-633 930 **See Field 9B**

5C. ECONOMICS

AD-633 546 **Field 5C, 12A, 5D**
CFSTI Prices: HC$3.00 MF$0.75
Cowles Foundation for Research in Economics, Yale Univ., New Haven, Conn.

NOTES ON THE TAXONOMY OF PROBLEMS CONCERNING PUBLIC GOODS,
by Martin Shubik. 19 Apr 66, 89p Discussion paper-208
Contract Nonr-3055 (00)

Descriptors: (*Distribution (Economics), *Game theory), (*Economics, Game theory), (*Public opinion, Distribution (Economics)), Political science, Social sciences, Commerce.

This paper deals with those situations involving an intermix of political, economic and social conditions arising from the needs and desires of a society to control the use of goods or services which cannot be allocated efficiently by a market mechanism alone. The items included are those which cause nuisance or harm to others, those which must be jointly constructed by taxation of privately appropriated resources; those which are unique natural heritages such as beauty spots; items held in common (res communes) such as air and light; and a host of others. An attempt is made to set the problems arising from the features of communal goods into a game theoretic framework. (Author)

AD-633 739 **Field 5C, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Cowles Foundation for Research in Economics, Yale Univ., New Haven, Conn.
EQUAL PROFITS AS A FAIR DIVISION,
by James W. Friedman. 18 Apr 66, 19p
Contract Nonr-3055 (00)

Descriptors: (*Game theory, *Economics), (*Decision theory, Economics), Distribution (Economics), Distribution theory, Optimization.

This paper reports the results of a duopoly experiment in which each firm was represented by one subject, and the two subjects comprising a duopoly could send messages to one another prior to making their decisions. The questions to which the experiment is addressed are: (1) To what extent are a pair of subjects able to agree on a joint course of action. (2) When subjects agree, is the profit point they agree upon Pareto optimal, and (3) Among Pareto optimal points chosen, does any particular point, such as the joint profit maximum, the Nash cooperative game solution, or the point of equal profits, predominate.

AD-633 919 **Field 5C, 5D**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
DEVELOPMENT OF FOREIGN TRADE RELATIONS OF THE USSR AND THE PROBLEMS OF MARITIME TRANSPORT,
by A. Savelev. 1966, 23p Translation-1029
TT 66-61436
Razvitie Vneshnetrogovykh Svyaezi USSR i Zadachi Morskogo Transporta, trans. of Morskoi Flot (USSR) n3 p35-9 1964.

Descriptors: (*Commerce, USSR), (*Economics, USSR), (*Shipping (Marine), USSR), Foreign policy, Water traffic, Merchant vessels.

AD-634 020 **Field 5C**
CFSTI Prices: HC$2.00 MF$0.50
Northwestern Univ., Evanston, Ill. Dept. of Geography.
A MODEL FOR THE AREAL PATTERN OF RETAIL AND SERVICE ESTABLISHMENTS WITHIN AN URBAN AREA.
Technical rept.,
by Michael F. Dacey. Apr 66, 49p TR-2
Contract Nonr-1228 (37),
Task 389-143

Descriptors: (*Commerce, Urban areas), Geography, Distribution (Economics), Stochastic processes, Mathematical models, Economics.

Three components of the areal pattern of retail, service and other commercial establishments within an urban area are (i) a dominant element formed by the location of the central business district and other commercial centers of varying sizes, (ii) a local element formed by the locations of establishments within each commercial center, and (iii) a diffused element formed by the scattered locations of large numbers of isolated establishments. The purpose of this study is to incorporate these components of pattern into a stochastic model for the locations of commercial establishments within an urban area. The internal structure of an urban area is described by measures of spacing between establishments having particular kinds of neighborhood relations. Though the basic model uses general functions to specify the locations of establishments, the study of specific spacing measures is primarily for an urban area where the locations are given by bivariate normal distributions. For the 'normally distributed' urban area, probability distributions of distance between pairs of establishments having specified kinds of neighborhood relations are obtained. Probability distributions are also given for distance between establishments where parameters of the bivariate normal distribution are random variables obeying the gamma or beta probability law. (Author)

PB-169 705 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL, ST. CLAIR COUNTY, ALABAMA,
by James N. Lowe, David Brown, Robert H. Myers,Henry W. Dill Jr., and Clifton W. Housley.
Jun 63, 60p

Descriptors: (*Economics, Alabama), (*Alabama, Economics), (*Recreation, Alabama), Transportation, Industries, Lakes, Natural resources, Traffic, Roads, Costs.

Identifiers: Tourist industry, Recreation facilities, Motels, Area redevelopment.

The area has three major assets favoring future growth of tourism and recreation. These are (1) the two lakes to be created by the Logan-Martin and Lock 3 Dams, and the opportunities present for the development of new businesses and recreation facilities of substantial magnitude and variety along their shorelines; (2) proximity to metropolitan Birmingham, with its present and anticipated large population base and high incomes; and (3) accessibility to other major population centers and potential tourist traffic. Improvements or adjustments must be made before business and development potentials can be realized. Foremost among these are (1) establishing desired controls over the types and quality of developments along the lake frontage, with greater emphasis on safeguarding and increasing the number of public-use areas and quality-type commercial facilities; (2) initiating and carrying out the planning and construction of an adequate system of access roads to existing and proposed development areas; and (3) expanding and developing tourism-recreation facilities and service installations including quality-type accommodations.

PB-169 710 **Field 5C, 8F**
CFSTI Prices: HC$7.00 MF$1.75
Area Redevelopment Administration, Washington, D. C.
THE POST WAR II ECONOMIC RECOVERY IN NASHUA, NEW HAMPSHIRE,
by Abraham Siegel. Aug 63, 345p

Descriptors: (*Economics, New Hampshire), (*New Hampshire, Economics), (*Textile industry, New Hampshire), Massachusetts, Maine, Vermont, Employment, Labor, Industries.

Identifiers: Area redevelopment.

Nashua was threatened, on September 13, 1948, with the elimination of one-third of its job opportunities in manufacturing before the year was out. On that morning, Textron, Incorporated, the largest single employer in the city, announced that it would close down its mills by December 1948. In less than two and a half years, the Nashua economy was running at full tilt and its labor market, with an unemployment rate of under 3 per cent, was tight. A second challenge (stemming directly from the way in which the first was tackled) intervened in late 1951 when the Jackson Mills liquidated operations; but once again, within little more than a year, unemployment was down to just a little over 4.5 per cent and within two years, a new employment high from which the Nashuans have continued to move forward had been reached. The Nashuan economic base, in the process, had been further diversified, average annual wages had increased substantially, and unemployment has continued at enviably low levels. Conceivable hypotheses relating to the Nashuan local recovery are enumerated, and their significance in the recovery effort is assessed. The relevance of these factors for comparable other recovery efforts is either implicit in the nature of the generalization or, where this is not the case, explicitly explored in the course of the enumeration.

PB-169 711 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Bloch (Ivan) and Associates, Portland, Oreg.
INDUSTRIAL PLANT SITES OF COLUMBIA COUNTY, OREGON.
Jun 64, 188p
Contract Cc-5832
Research supported in part by Port of St. Helens, Columbia County, Oregon.

Descriptors: (*Economics, Oregon), (*Oregon, Industries), (*Industries, Oregon), Site selection, Shipping (Marine), Water traffic, Transportation, Natural resources, Employment, Labor, Roads, Power supplies, Water supplies, Industrial plants.

Identifiers: Area redevelopment, Ports.

Conclusions: The need for sites for major heavy industry establishment in the Pacific Northwest is acute. There are few, if any, land areas which are suitable for industrial plant location having ready access to deep-draft navigation. Columbia County possesses a number of such areas. Three site areas are recommended for first-priority improvement and one for second-priority consideration. These include Site No. 2, Locoda (Beaver) which is now being declared surplus by the U. S. Department of the Army; Site No. 4, Rainier-Pacific Power and Light Co. site, the development of which might be assisted by the Port of St. Helens; Site No. 7, Deer Island, which possesses the most interesting long-term potential for development in the Lower Columbia River area, and for which the Port of St. Helens should initiate and execute planning, engineering and construction steps. Site No. 9, Milton Creek, requires improvements at water-side which the Port of St. Helens should explore in conjunction with the U. S. Army Engineer District Portland. Recommendations are made that would initially provide relatively small employment of short duration. However, major heavy industries, the establishment of which would be facilitated by the provisions of site areas, would provide important payrolls of long-term duration. (Author)

PB-169 712 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Herkenhoff (Gordon) and Associates, Albuquerque, N. Mex.
RECREATION FACILITIES FOR STORRIE LAKE.
Engineers primary rept.
Jun 64, 36p
Contract Cc-6123

Descriptors: (*Economics, New Mexico), (*Recreation, Economics), (*New Mexico,

Economics), Commerce, Natural resources, Employment, Costs, Lakes.

Identifiers: Area redevelopment, recreation facilities.

From the study foregoing, it is concluded as follows: (1) Storrie Lake State Park has limited recreational potentials but will fulfill a localized need for a present and future facility. (2) The development of recommended facilities should be financed by revenue bonds and operated by New Mexico State Park personnel. (3) A park use fee of $.50 per day or the sum of $1.00 for overnight camping should be charged for each motor vehicle entering the park. It is therefore recommended that: (1) The overall Master Plan be completed. (2) Preliminary plans to develop the recommended expansion of facilities be prepared. (Author)

PB-169 713 **Field 5C, 13B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Lockwood Greene Engineers, Inc., Spartanburg, S. C.
FEASIBILITY STUDY OF PROPOSED WATER SYSTEM IN MARLBORO COUNTY, SOUTH CAROLINA, FOR AREA REDEVELOPMENT ADMINISTRATION, WASHINGTON, D. C.
Feb 65, 62p
Contract Cc-6170

Descriptors: (*Economics, South Carolina), (*South Carolina, Water supplies), (*Water supplies, South Carolina), Feasibility studies, Costs.

Identifiers: Area redevelopment, Taxes.

Recommendations: An area-wide water system to serve the five community areas of Bennettsville, Clio, McColl, Tatum and Blenheim be constructed to basically consist of a filter plant at Lake Wallace, clearwell, elevated storage tanks, main water lines, distribution water lines and appurtenances. Existing and proposed water systems become the property of the Marlboro Water Authority upon approval of the water district citizens and be operated by its personnel. The water system is to be financed by a General Obligation Bond Issue of $2,270,000 at 4% interest to be retired by revenue from the sale of water and a tax levy. The tax levy is to be noted on for approval. The area is to be formed as a Water District by the South Carolina Legislature and that this District have the power to levy taxes necessary to offset the deficit caused by insufficient revenue from the sale of water. The bonded indebtedness of the existing systems is to be retired from the sale of the General Obligation Bonds. Profit from tap fees be used for constructing additional lines, extending and repairing existing lines. (Author)

PB-169 717 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Economic Associates, Inc., Washington, D. C.
PROMISING INVESTMENT OPPORTUNITIES IN SOUTH CENTRAL ALASKA.
Jan 65, 48p
Prepared in cooperation with William P. Rock Associates, Washington, D. C. Rept. on Technical Assistance Proj., U. S. Dept. of Commerce.

Descriptors: (*Economics, Alaska), (*Alaska, Economics), Commerce, Industries, Seafood, Bovines, Agriculture, Oils, Gases, Natural resources, Forestry, Fertilizers, Cements, Fur, Employment, Costs.

Identifiers: Area redevelopment, Ports, Feed, Natural gas, Investments, Land, Animal husbandry, Food industry.

The report summarizes findings and recommendations which were developed during the 3-week field survey of South Central Alaska by a two-man team in September of 1964. The purpose was to identify promising investment opportunities in this area, establish the rationale for each project, and recommend those projects which could assist individual communities in creating new jobs to take up the expected slack after the post-earthquake reconstruction program had been completed. Emphasis was placed on investment opportunities consisting principally of short-run projects that could be started in specific communities in the next 2-3 years to take up the expected slack in employment after the reconstruction job had been completed. A more rational development of Alaska's sea food resources is one of the most important problems facing the industrial planners and should command highest priority. Development of local agriculture, including beef-cattle raising, on Kodiak and Kenai should command the next order of priority. The growth of the South Central oil industry is likely to be governed by the world supply and demand, and not much could be done in Alaska to stimulate its expansion. But liquefying natural gas or using it to produce ammonia - both for export to Japan - are projects which could be greatly stimulated with proper promotional effort. Further development of forest resources also offers promising investment opportunities. However, it is not certain that the South Central region could successfully compete with South Eastern Alaska.

PB-169 722 **Field 5C, 11L, 2F, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Schultz (C. D.) and Co., Inc., Seattle, Wash.
ECONOMIC SURVEY OF WOOD PRODUCTS FROM YAKIMA INDIAN RESERVATION.
Technical assistance project summary.
31 Dec 63, 48p
Contract 14-20-0650-1266,
Proj. 19-BIA

Descriptors: (*Economics, Washington (State)), (*Washington (State), Industries), (*Wood, Washington (State)), Forestry, Transportation, Wood pulp, Trees, Commerce.

Identifiers: Indian reservations, Area redevelopment, Wood industry.

SUMMARY: A market already exists, or is potentially available, in the Yakima, Goldendale, Glenwood and Randle areas for the associated species of true fir, hemlock and lodgepole pine. Timber sales with increasing proportions of associated species should be offered for sale to the existing wood-using industry. A stud mill or a sawmill can be established and operated profitably near White Swan. The wood supply is available from both the Yakima and Klickitat Working Circles. A large potential market exists for pole products from small roundwood thinnings in the Yakima agricultural area. The successful development of the pole market demands careful manufacture and competitive merchandising of the products to satisfy the purchasers' seasonal requirements, and involves the establishment of a treating plant and storage yard. The capital cost of the facilities would be about $40,000. At present, little or no demand exists for pulp logs, house poles, export logs and other specialized uses of the Reservation timber. (Author)

PB-169 732 **Field 5C, 8F, 11L**
CFSTI Prices: HC$2.00 MF$0.50
Sanders (Paul M.), Portland, Oreg.
FEASIBILITY STUDY OF PINTLAR FOREST PRODUCTS, INC., PHILLIPSBURG, GRANITE COUNTY, MONTANA,
30 Jun 64, 42p PR-30
Contract Cc-6126,
Proj. 696
Prepared in cooperation with Graves (Kenneth K.), Portland, Oreg.

Descriptors: (*Economics, Oregon), (*Oregon, Economics), (*Forestry, Oregon), Feasibility studies, Industries, Wood, Costs, Labor, Commerce.

Identifiers: Area redevelopment, Wood industry.

Summary: There is sufficient merchantable public and private timber within economic range of Philipsburg to permanently sustain operations of Pintlar Forest Products, Inc. at an annual rate of 40,000 M board feet, log scale. There will be an additional annual volume of approximately 11,000 M board feet, log scale, of merchantable timber available for other forest industries within the Philipsburg tributary forest area. The present mill with proposed modifications and operated on a two-shift basis will be an efficient unit, well designed for the multiple specie forest tributary to Philipsburg, which is composed of trees of wide range of sizes. The price of $1,250,000 for the assets of Montana Forest Products, Inc. is a fair price and reasonably representative of their fair market value at June 1, 1964. Pintlar Forest Products, Inc. is best suited for production of kiln dried, mixed car lumber products for rail shipment to the midwest lumber market. The species, grade and quality of lumber products prodcted by the Philipsburg mill will be of excellent standards and readily accepted by the markets which they reach. (Author)

PB-169 736 **Field 5C, 2F, 11L, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Smith (Kenneth), San Francisco, Calif.
AN ANALYSIS OF FUTURE DEVELOPMENT POSSIBILITIES OF NAVAJO FOREST PRODUCTS INDUSTRIES, NAVAJO, NEW MEXICO.
1963, 118p
Contract 14-20-0650-1057,
Proj. 15-ARA-TA

Descriptors: (*Economics, Forestry), (*Arizona, Industries), (*New Mexico, Industries), (*Wood, Industries), Charcoal, Wood pulp, Plywood, Feasibility studies, Natural resources.

Identifiers: Indian reservations, Area redevelopment, Furniture, Wood industry.

Studies were conducted to determine (1) the utilization for byproducts resulting from operations of the Navajo Forest Products. Industries (NFPI) and (2) the most profitable market outlets for lumber and other products manufactured by the NFPI sawmill, that was timber from both Arizona and New Mexico. Investiment of $1,100,000 (of which $990,000 is for plant) is recommended in a particle board plant estimated to produce 55 tons of finished flakeboard/day, employ Navajo workers, and earn $177,662/year. Should the Tribal Council not approve this investment, effort should be made for development by the Bureau of Indian Affairs and/or the Tribal Administration as an Area Redevelopment Administration project. The NFPI should participate in a veneer and plywood industry, based on Grades 5 and 6 Ponderosa Pine. Bark and sawdust waste at the Navajo mill should be used as soil conditioners for Navajo forms. Concrete blocks of wood shavings should be developed privately. There is no prospect of profitable/development of timber now left in the Navajo Forest.

PB-169 741 **Field 5C, 8F, 11B, 8I**
CFSTI Prices: HC$4.00 MF$1.00
Aase (George) and Associates, Inc., Tallahassee, Fla.
FEASIBILITY STUDY OF A PROPOSED STRUCTURAL CLAY PRODUCTS INDUSTRY IN REDEVELOPMENT AREA A, NORTHWEST FLORIDA.
Oct 64, 134p
Contract CC-6028

Descriptors: (*Economics, Florida), (*Florida, Economics), (*Clay, Industries), Feasibility studies, Brick, Ceramic materials, Commerce, Costs, Industrial plants, Natural resources, Economic geology.

Identifiers: Area redevelopment.

An investigation of markets for clay products initially included bricks, drain tile, structural tile,

quarry or floor tile and lightweight aggregate. It was determined that markets existed - in the area which could be served by a west Florida plant - for common building bricks and, to a minor extent for drainage tile. A total market consumption of 100,000,000 bricks per year was indicated and it was considered that a plant located in west Florida could reasonable expect to capture approximately thirty-five percent of that market. A preliminary program of drilling, sampling and testing of the clay deposits in the area indicated several possible deposits of sufficient extent and quality to permit commercial production of clay. Laboratory tests of the clay indicated that commercially acceptable brick and drain tile could be made in west Florida. The market potential for drain tile was insufficient to warrant the inclusion of tile producing facilities in the plant, but that bricks could be produced at a competitive price which should allow for a profitable return on invested capital.

PB-169 944 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Dept. of Public Works, Boston.
CAPE CODE TOURIST STUDY,
14 Apr 65, 66p
Availability: Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Economics, Massachusetts), (*Massachusetts, Economics), (*Recreation, Economics), Urban areas, Management planning, Urban planning, Statistical analysis, Sampling.

Identifiers: Tourist industry, Recreation facilities.

During the month of August 1963, the Department of Public Works conducted a roadside survey on the approaches to Cape Cod to determine the impact of motor travel on the cape. This survey was scheduled for the peak period of tourist travel to provide the broadest possible sample of tourist practices and interests.

PB-169 945 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Arkansas Univ., Fayetteville. Bureau of Business and Economic Research.
TRAVEL BUSINESS IN ARKANSAS 1954-1960,
by W. A. Heffelfinger. 1960, 38p
Availability: Prepared in cooperation with Arkansas State Highway Dept. and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Economics, Arkansas), (*Arkansas, Economics), Commerce, Transportation, Statistical analysis, Tables, Statistical data, Recreation.

Identifiers: Tourist industry.

During 1960, the total sales and receipts of Arkansas' travel-serving business establishments amounted to more than $333 million. This was one-sixth of the State's total retail trade and service volume. It is estimated that approximately one-half of these total receipts are derived from sales to 'travelers' while the balance comes from local business sales. Travel-serving businesses are the various enterprises that depend to a considerable degree on sales and service to travelers, especially those who travel by automobile. They include gasoline service stations, eating and drinking places, hotels, motels, and other lodging places, and recreational services other than movies. Such businesses are of growing importance in Arkansas' economy. Their sales and receipts have increased by nearly 50 per cent since 1954. During the same period, the State's total retail and service trade has increased 36 per cent. Estimates of total spending in the State during 1960, for all types of travel activity, indicate that it will soon exceed $200 million annually. This includes the travel expenditures of Arkansas residents for trips within the State, as well as spending by visitors from other states and countries. (Author)

PB-170 039 **Field 5C, 11L, 8F**
CFSTI Prices: HC$6.00 MF$1.25
Spindletop Research Center, Lexington, Ky.
TECHNICAL AND ECONOMIC FEASIBILITY OF ESTABLISHING A HARDWOOD PULP AND PAPER MILL IN AN EIGHT-COUNTY AREA OF WESTERN KENTUCKY.
Final rept.,
by Charles B. Garrison, Morris W. Gildemeister, andWilburn J. Pratt. 20 Feb 64, 205p

Descriptors: (*Economics, Kentucky), (*Kentucky, Industries), (*Paper industry, Kentucky), Feasibility studies, Commerce, Wood, Wood pulp, Water supplies, Power supplies, Site selection, Transportation, Costs, Forestry, Labor.

Identifiers: Area redevelopment.

One of the major advantages of Western Kentucky as a site for a pulp and paper mill is its abundance of hardwood timber resources. There is sufficient hardwood volume in the Paradise area to support several pulp mills. Within a 50-mile radius of Paradise the annual net growth of hardwood trees with a diameter of 14 inches or less is about 228,000 cords. In addition, the area contains about 2,700,000 cords of cull trees which are suitable for pulping. Cutting these cull trees could increase the growth rate of growing stock timber by as much as 50 percent. The hardwood resources could support in NSSC mill or a hardboard mill, and could provide a substantial proportion of the material requirements of a kraft mill. The latter type of mill could purchase market softwood pulp for its long-fiber needs. It is also possible that a kraft mill, by procuring softwoods from adjacent states, could pulp a mixture of hardwoods and softwoods. Sufficient water of acceptable quality is a prerequisite to a successful pulp and paper mill. For this reason, potential mill sites were limited to those areas adjacent to the Green River in Muhlenberg and Butler Counties, where the most favorable stream flow rates within the study area are found.

PB-170 043 **Field 5C, 5I, 13B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Dunkirk, N. Y.
COMMUNITY FACILITIES AND MUNICIPAL FISCAL ANALYSIS. EXHIBIT I.
1965, 62p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Urban areas, New York), (*New York, Urban areas), (*Economics, New York), Urban planning, Education, Industries, Water supplies, Sewage, Costs.

Identifiers: Area redevelopment, Taxes.

The survey of major public or community facilities and services in Dunkirk and Fredonia is intended to provide an immediate appraisal of the general scope and quality of services and facilities provided by the City of Dunkirk and the Village of Fredonia together with the general fiscal picture of these two communities. This analysis serves to establish the fact that more municipal services are provided than in the average city, that the quality of services and maintenance and condition of facilities is high, and that services are provided at reasonable costs. The chief finding is that no important unforeseen capital outlay expenditures for city facilities which could substantially increase tax rates are likely to occur in the near future. With respect to schools, no major outlay is foreseen for the Village of Fredonia. The situation in the City of Dunkirk is less favorable and requires careful study and decision by citizens of Dunkirk. These two communities, along with the Town of Dunkirk, the Town of Pomfret, the Town of Sheridan and the Village of Silver Creek are presently participating in a '701' Planning Study for the purpose of developing a General Plan for the Region. This will include a detailed study of economic background, transportation, public utilities, land use, schools and public buildings, and zoning and subdivision regulations.

PB-170 051 **Field 5C, 8F, 5A**
CFSTI Prices: HC$4.00 MF$1.00
System Development Corp., Santa Monica, Calif.
ON A MODEL OF AN APPLACHIAN REGIONAL COMMISSION.
14 Oct 64, 139p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Management planning), Urban areas, Urban planning, Rural areas, West Virginia, Alabama, Georgia, Kentucky, Maryland, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia.

Identifiers: Area redevelopment, Appalachian region.

Chapter I is the INTRODUCTION. Chapter II, FORMING AND ENABLING THE COMMISSION, provides the sample basic instruments and suggested procedural steps through which the Commission can emerge from its initial business meeting as an effective, ongoing organization. Chapter III, FUNCTIONS OF THE COMMISSION, delineates and designs the commission functions that are to encompass those areas in which it must operate. These functions are further related and defined in terms of their relationships to other segments of the project. This section also presents the rationale for the organizational entity which would be created by Commission actions. Chapter IV, RECOMMENDED ORGANIZATION: STRUCTURE, CONCEPTS, STAFFING, AND PROCEDURES, recommends a single process-oriented structure to enable the Commission to achieve its goals. Chapter V, MANAGEMENT PLAN, consists primarily of a flow chart which presents an integrated management plan. This plan presents a graphic description of the interdependencies among the personnel, fiscal, information management, research/evaluation, program development, technical assistance, and project review functions. (Author)

PB-170 053 **Field 5C, 2B, 6H, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Booker (R. W.) and Associates, Inc., St. Louis, Mo.
THE AGRICULTURAL MARKETING ASSOCIATION PROJECT SOCORRO COUNTY, NEW MEXICO.
Final rept.,
by R. W. Booker. Oct 63, 129p
Contract Cc-5993

Descriptors: (*Economics, New Mexico), (*New Mexico, Economics), (*Agriculture, New Mexico), Commerce, Cereals, Animals, Bovines, Vegetables, Geography, Climatology, Natural resources, Wood, Site selection, Industries, Processing, Costs, Food, Management planning, Distribution (Economics).

Identifiers: Area redevelopment.

Contents: Overall Planning and Sequence of Projects: Feed Grinding, Mixing, Pelletizing and Packaging Plant: Alfalfa Chopping and Drying Unit: Livestock Auction Facility: Vegetable Processing and Packaging Plant: Other Projects that would Have a Coordinate Purpose: Methods of Financing the Enterprises: Natural Resources and Present General Economy: Economic Potential: Details on overall planning and sequence of projects: Details on Feed Grinding, Mixing and Pelletizing Plant: Details on Alfalfa Chopping and Drying Unit: Details on Livestock Auction Facility: Details on Vegetables process-ing Plant: Details on Other Projects that would have a Coordinate Purpose: Details on Methods of Financing the Enterprises. (Author)

PB-170 102 **Field 5C, 13B**
CFSTI Prices: HC$2.00 MF$0.50
National Park Service, Washington, D. C.

FEASIBILITY STUDY FOR DEVELOPMENT OF A NEW RIVER GORGE NATIONAL PARKWAY VIRGINIA AND WEST VIRGINIA.
Oct 63, 38p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Virginia, Roads), (*West Virginia, Roads), Recreation, Economics, Geography, History, Rivers, Dams, Industries, Costs, Feasibility studies.

Identifiers: Tourist industry, Area redevelopment.

The study to determine the feasibility of constructing a National Parkway along the New River Gorge falls under the general authorization of the Park, Parkway, and Recreational Study Act, approved June 23, 1936. That act stipulates that the study 'will provide data helpful in developing a plan for coordinated and adequate public park, parkway, and recreational area facilities for the people of the United States.'

PB-170 111 **Field 5C, 5I, 11L, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Berea Coll., Ky.
SUMMER WORK AND LEADERSHIP TRAINING PROJECT.
Final rept.
1964, 26p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Kentucky), (*Kentucky, Industries), (*Wood, Industries), (*Training, Industries), Symposia, Students, Education, Geography, Employment, Management engineering.

Identifiers: Area redevelopment, Appalachian region, Wood industry.

During June, July and August of 1964, the contractor, with the cooperation of the University of Louisville and several Kentucky woodworking firms, carried out a summer work and leadership training program. The program involved placing select college students from the Appalachian region in positions in woodworking shops and augmenting their work experience with a series of informative seminars on aspects of the wood industries. That the program was successful in meeting its specific, short-range objectives is indicated by the points: (1) Each participating student was employed, with a regular income, in a wood industry plant. The wages earned were, on the average, slightly above those which the students might have expected at unselected jobs and therefore were satisfactory. (2) Through the seminars the students were given broadening experiences in areas which they would not be at all likely to meet in the usual academic or labor programs. The diversity of ideas and contacts to which they were exposed was powerfully stimulating to the students as evidenced by their interest in the discussion periods and their candid responses to questions from the evaluator. (3) The fact of the existence of the program and the necessary orientation provided each of the participating employers obviously increased awareness of Appalachian wood utilization problems among local industry and labor leaders. (4) By exposure to a concentrated and active experience in wood industries and a program of extensive orientation to these industries and related areas the students were enabled to add significant realism to their career choices.

PB-170 218 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Layton, Layton and Associates, St. Louis, Mo.
FEASIBILITY STUDY AND MASTER PLAN FOR AN INDUSTRIAL PARK IN WASHINGTON, MISSOURI,
by Emmet Layton. Aug 65, 54p
Contract C-57-65

Descriptors: (*Economics, Missouri), (*Missouri, Economics), Feasibility studies, Costs, Sewage, Water supplies, Natural resources, Transportation, Roads, Power supplies.

Identifiers: Area redevelopment, Industrial parks.

The city of Washington, Missouri, contains a rapidly increasing population of 8,000 that is confidently predicted to achieve 12,000 within a trade area of approximately 100,000 by 1985. As the largest city in the rich, populous area between Metropolitan Saint Louis and the state capital at Jefferson City, Washington is the most convenient center for trade, distribution and employment for the 60,000 residents of the adjoining Franklin, Warren and Gasconade Counties. Within its trade area, Washington traditionally enjoys the highest payroll per 1000 persons of any comparable city and captures a greater share of its potential market. Recently, however, competition is emerging in previously stabilized communities, and temporary closing of the international Shoe Factory unbalanced Washington's local economy sufficiently to justify the Technical Assistance Grant from the Area Redevelopment Administration which supported this study. Prompt and dynamic action by local leadership, plus strong support for industrial development and improved municipal services leave little doubt that Washington, Missouri will make maximum use of the Federal assistance which has contributed so much to their already visible economic recovery.

PB-170 220 **Field 5C, 8F**
CFSTI Prices: HC$6.00 MF$1.25
Old Dominion Coll., Norfolk, Va.
DEVELOPMENT OPPORTUNITIES FOR VIRGINIA'S EASTERN SHORE,
by Elbert V. Bowden. Feb 63, 235p
Contract Cc-5937
A Study to Find Out What Specific Steps Should be Taken to Prepare for and to Influence the Speed and Direction of Economic Development in Accomack and Northampton Counties, Virginia, including Chincoteague and Tangier Islands.

Descriptors: (*Economics, Virginia), (*Virginia, Industries), (*Industries, Virginia), Seacoast, Beaches, Islands, Employment, Seafood, Recreation, Population, Labor, Natural resources, Buildings, Education, Training, Attitudes, Commerce, Urban areas, Traffic, Agriculture, Forestry, Processing, Site selection, Chesapeake Bay.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

CONTENTS: Introduction to the area: Political Structure and Population; Employment Patterns; Income Patterns. Characteristics of the area: Natural characteristics; Analysis of available facilities and buildings; Attitudes and abilities of the people; organizations and institutions; effect of surrounding areas on growth potential; other characteristics which affect the growth potential. Improving the development potential of the area: Developing easier access to the Norfolk-Portsmouth-Newport News Metropolitan areas; developing skills in the labor force; establishing land-use controls. Expansion of recreation and travel-related activities: Expansion of highway-related activities; recommendations for development of the seaside island beaches; development of campsites and related outdoor recreation activities; improving Tangier's tourist business; establishment of balanced recreation centers; publicity and promotion. Improving the production, processing, and marketing of seafood products: Increasing the oyster harvest; expansion and stabilization of seafood processing; financing the new seafood processing operations; development of efficient marketing methods. Improving and expanding the processing and marketing of selected agricultural and forest products: Improving the marketing of Eastern Shore potatoes; establishing sweet potato and pumpkin flaking; other food processing opportunities; establishing wood preserving. Other industrial development opportunities. (Author)

PB-170 228 **Field 5C, 8F**
CFSTI Prices: HC$7.00 MF$1.75
Stevens and Wilkinson, Atlanta, Ga.
TENNESSEE STATE PARK SYSTEM.
Final rept.,
by H. B. Masters. 28 Jun 63, 369p
Contract Cc-6040

Descriptors: (*Economics, Tennessee), (*Tennessee, Economics), (*Recreation, Tennessee), Commerce, Natural resources, Industries, Management engineering, Costs, Employment, Site selection, Dams, Mountains, Lakes.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

14 areas were investigated but, in accordance with the Contract, only those 'found to possess substantial tourism potential and associated impact on employment and income for designated counties' were chosen to receive intensive study. The latter number of areas totaled five. These included Montgomery Bell State Park, Dickson County; Fall Creek Falls State Park, Van Buren and Bledsoe Counties; Norris Dam State Park, Campbell and Anderson Counties; Roan Mountain area, Carter County; and Big Hill Pond area, McNairy and Cocke Counties. Comprehensive reports on each of these five areas are included as separate sections of this report. Brief assessments of each of the other nine areas, with recommendations for improvements, are appended. In addition to the reports on the individual parks the report includes sections containing general recommendations on programming, economic potential, administrative organization, and other facets of the total park system that will be useful to the State of Tennessee in its overall development. (Author)

PB-170 229 **Field 5C, 8F, 13B**
CFSTI Prices: HC$4.00 MF$0.75
Program Research, New York.
MEADVILLE LABOR MARKET AREA IN CRAWFORD COUNTY, NORTHWESTERN PENNSYLVANIA,
by Virginia Keyser. Sep 62, 111p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Employment), (*Employment, Pennsylvania), Urban areas, Commerce, Geography, Sociology, Industries, Natural resources, Management planning, Training, Agriculture, Recreation, Labor.

Identifiers: Area redevelopment, Tourist industry.

Four principal potentials for increased employment are: (a) The fostering of product innovation both by existing industry and by entrepreneurs. This is probably the most remunerative source for long-term growth of the economy. 3b) Two of the largest lakes in Pennsylvania offer an already established base for a greatly expanded resort tourist and weekend recreation industry. Proper exploitation offers an immediate opportunity for employment expansion. (c) The area's geographic position in relation to a number of major industrial complexes lying south, west and north of it create a locational advantage particularly for the manufacture of industrial components or other products for use by the neighboring industries. (d) The presence of a large site with utility services already developed may answer site requirements by industry, possibly defense industry, for a large flat area.

PB-170 236 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Bureau of Outdoor Recreation, Washington, D. C.
OLYMPIC PENINSULA. TOURIST AND RECREATION POTENTIAL.

by James N. Lowe, David Brown, Henry W. Dill Jr., and Dale Q. Haskins. Dec 63, 138p
Availability: Original document in color until exhausted. Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Washington (State), (*Washington (State), Economics), (*Recreation, Economics), Industries, Roads, Seacoast, Bridges, Sounds.

Identifiers: Area redevelopment, Indians, Indian reservations, Tourist industry, Recreation facilities, Highways, Motels.

RECOMMENDATIONS: A Pacific coastal highway be located and completed along the Washington coast from the Oregon border through Taholah, Queets, and Ozette to Neah Bay. The 8-mile Pacific coastal strip between the north end of the Olympic National Park coastal corridor and the southwest corner of the Makah Indian Reservation be acquired for public recreation purposes. The Washington State Ferry System be recognized as an extension of the State highway system and supported from a common fund. Continued consideration be given to the construction of bridges across the Puget Sound. Hotel-motel accommodations of the area be upgraded and that additional luxury facilities be created. The full potential of the present State and county parks be developed, particularly those in Pacific and Clallam Counties. The county road leading through Old Royal to Ozette be brought up to standard and hard-surfaced. The overnight commercial accommodations in the Olympic National Park be upgraded and expanded. Cypress Island in the San Juan Islands be acquired for public park and recreation purposes.

PB-170 239 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: SHAWNEE STATE FOREST AREA, SCIOTO COUNTY, OHIO,
by James N. Lowe, David Brown, Henry W. Dill Jr., Ross Floyd, and Robert L. Black. Jan 64, 61p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Ohio), (*Ohio, Economics), (*Recreation, Ohio), Lakes, Dams, Industries, Roads, Forestry, Rivers, Costs, Employment, Piers.

Identifiers: Area redevelopment, Fish and wildlife, Marina, Tourist industry, Recreation facilities.

It is recommended that additional public lands be acquired to create more feasible development units within the Shawnee State Forest; a commercial marina facility be developed on the Ohio River floodplain in the vicinity of the village of Friendship, just south of the Shawnee State Forest proper; a resort-lodge complex be developed in the vicinity of the village of Friendship (see development area No. 6 on Plate 3) on the high terrace overlooking the Ohio River; a dam be constructed on the site selected by the Ohio State Water Division, on Turkey Creek above Roosevelt Lake; a dam be constructed on Mackletree Run above Roosevelt Lake; the camping space at Roosevelt Lake be closed and that the area be devoted to picnicking and other day uses; a rustic-type lodge and cabins be planned and developed in the area adjacent to the impoundment to be created above Roosevelt Lake on Turkey Creek; a dam be constructed on Odell Creek, and that the area be developed as campgrounds, with separate units for tent and trailer campers; a system of one-way drives be designated for the Forest area proper and that the principal roads be blacktopped.

PB-170 241 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: EASTERN SHORE, MARYLAND (SOMERSET COUNTY),
by James N. Lowe, David Brown, Neil J. Stout, andWilliam H. Honore. Jan 65, 76p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Maryland), (*Maryland, Economics), A (*Recreation, Maryland), Natural resources, Islands, Seacoast, Beaches, Seafood, Industries, Site selection, Employment, Population, Commerce, Urban areas, Agriculture, Chesapeake Bay, Roads.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

The study was undertaken to point up promising possibilities for expanding tourism-recreation as one means of stimulating the economy of Somerset County. Underlying study objectives were to: (1) Appraise existing tourism and recreation facilities and developments in or near Somerset County, particularly as they relate to the present and prospective demand for outdoor recreation; (2) identify and describe the recreation resources and other assets of the county which appear in the study area; (3) identify obstacles that must be overcome if the tourism and recreation growth potentials of the area are to be achieved; (4) identify general locations and types of facilities which appear to offer the greatest potential for recreation development; and (5) suggest actions necessary to achieve the tourism-recreation potentials of the study area. The report summarizes the present status of tourism-recreation development; indicates present and prospective tourist markets; identifies major adjustments needed to achieve the tourism-recreation growth potentials; suggests locations which appear to offer good development possibilities, and recommends actions necessary if potentials are to be achieved. (Author)

PB-170 242 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: TABLE ROCK LAKE, MISSOURI (BERRY, STONE AND TANEY COUNTIES),
by James N. Lowe, David Brown, Robert H. Myers, andHenry W. Dill Jr. Jul 63, 54p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Missouri), (*Missouri, Economics), (*Recreation, Economics), Lakes, Recreation, Commerce, Roads, Natural resources, Fishes, Animals, Traffic.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

The report describes the study area, evaluates its tourist and recreation potentials, analyzes the existing and potential tourist markets, identifies major adjustments that must be made to achieve the maximum effects of a tourism-recreation program on the economy of the area, appraises the proposed ARA development projects, and recommends actions nece..sary to realize the tourism-recreation potentials of the area. (Author)

PB-170 243 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$1.00
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL: THE CUMBERLAND PLATEAU AREA (KENTUCKY, TENNESSEE, ALABAMA, AND GEORGIA),
by James N. Lowe, David Brown, Henry W. Dill, andRolland B. Handley. May 65, 148p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Tennessee, Economics), (*Alabama, Economics), (*Georgia, Economics), Recreation, Industries, Roads, Natural resources, Mountains, Rivers, Forestry, Ecology, Lakes, Transportation.

Identifiers: Tourist industry, Recreation facilities, Area redevelopment, Fish and wildlife.

The report describes and locates the study area; summarizes the present status of tourism-recreation development; indicates present and prospective tourist markets; identifies major adjustments needed to achieve the tourism-recreation growth potentials; suggests locations which appear to offer good development possibilities, and recommends actions necessary if potentials are to be achieved. (Author)

PB-170 244 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.50
Harris, Kerr, Forster and Co., San Francisco, Calif.
REPORT ON MARKET AND SITE STUDY AND ECONOMIC FEASIBILITY OF A HOTEL AND OTHER LAND USES ON A SITE COVERING TWO SQUARE BLOCKS LOCATED BETWEEN HARRISON AND JACKSON AND 13TH AND 14TH STREETS IN DOWNTOWN OAKLAND.
19 Oct 64, 53p
Contract C-67-65

Descriptors: (*Economics, California), (*California, Economics), (*Urban planning, California), Commerce, Site selection, Urban areas, Industries, Feasibility studies, Employment, Buildings, Job analysis, Training.

Identifiers: Area redevelopment.

The objective of the study was to determine a plan of development for the entire two-block area available, the execution of which would best stimulate and support the economic development and growth of the City of Oakland, with particular emphasis on the creation of additional permanent employment particularly in those jobs requiring limited skills and training. (Author)

PB-170 245 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL LEWIS SMITH LAKE (CULLMAN, WALKER AND WINSTON COUNTIES, ALABAMA),
by James N. Lowe, David Brown, Robert H. Myers, Henry W. Dill Jr., and Clifton W. Housley. Jun 63, 64p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Alabama), (*Alabama, Economics), (*Recreation, Alabama), Industries, Lakes, Costs, Management planning, Commerce, Site selection, Natural resources, Fishes, Animals, Roads, Dams, Climatology.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Fish and wildlife.

Contents: The tri-county area; General description; The economy in brief; Fish and wildlife resources. Current status of tourism and recreation. Potential demand for tourism-recreation in area. Needed adjustments to achieve recreation potential: Control over lake frontage development; Construction of more access roads; Greater development of tourist attractions and facilities. Proposed development areas: Commercial areas -- resort-motel lodge complex, Deluxe quality motel complex, First-class trailer park, Lodge and camp complex, Other commercial areas; Public use areas; Areas with wilderness characteristics; Other proposed recreation developments; Estimated cost of typical developments.

PB-170 247 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Ernst and Ernst, Cleveland, Ohio.
WHEELING AS A LOCATION FOR INDUSTRY.
18 Nov 64, 64p
Submitted to the Board of OVIBDC by General Ondrick, 18 Nov 64.

Descriptors: (*Economics, West Virginia), (West Virginia, Economics), (*Industries, West Virginia), Urban areas, Urban planning, Commerce, Labor, Training, Natural resources, Site selection, Transportation, Power supplies, Water supplies.

Identifiers: Area redevelopment.

Table of Contents: Wheeling and its makeup; Transportation; Utilities; Labor; Occupational Training and Re-training under the Area Redevelopment Act; Vocational Training; Manufacturing and Natural Resources; City Tax Structure; State Tax Structure; West Virginia Workmen's Compensation; Available Financing Opportunities; Industrial Development Bond Act of 1963; West Virginia Industrial Development Authority; Available and/or Potentially Available Sites. (Author)

PB-170 248 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Caudill, Rowlett and Scott, Houston, Tex.
TOURIST AND RECREATION PROGRAM FOR ZAPATA COUNTY, TEXAS.
Sep 63, 97p
Proj. ARA-409
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Economics, Texas), (*Texas, Economics), (*Recreation, Texas), Industries, Site selection, Feasibility studies, Dams, History, Costs, Employment, Natural resources, Roads.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

A survey was made to demonstrate economic feasibility and recommend a program for better utilization of the area's tourist potential. A long range Five Step Program was suggested to more fully develop Zapata's resources and ultimately accomplish the objectives. The five steps are as follows: Develop and advertise historic sites, and the scenic value of Highway 83; develop and advertise more year round, family oriented recreation facilities in the Zapata area; promote early development of Falcon State Park and advertise the scenic, educational, and border crossing values of the Falcon Dam; promote and advertise Ciudad Mier as a tourist attraction; and advertise the Falcon Dam - Ciudad Mier route to Monterrey.

PB-170 252 **Field 5C, 13B, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Klein and Saks, Washington, D. C.
ECONOMIC GROWTH OPPORTUNITIES IN ASHTABULA COUNTY, OHIO AND RECOMMENDED PROGRAM FOR THEIR DEVELOPMENT,
by Richard L. Davies. 9 Sep 65, 114p
Contract C-97-65

Descriptors: (*Economics, Ohio), (*Ohio, Economics), (*Industry, Ohio), Steel industry, Management engineering, Commerce, Transportation, Urban planning, Employment, Training, Distribution (Economics), Labor, Costs, Warehouses, Shipping (Marine), Wood, Airports.

Identifiers: Area redevelopment.

A survey was made to establish a permanent future development program; to identify industrial expansion possibilities, particularly as related to increased employment; and to point the way to greater intergroup cooperation within Ashtabula County as a means of promoting economic growth and resolving common problems. (Author)

PB-170 253 **Field 5C, 13B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Checci and Co., Washington, D. C.
THE POTENTIAL POWER OF TOURISM - LAGUNA RESERVATION (NEW MEXICO),
by Harry G. Clement. Jan 63, 65p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C. Availability: Original document in color until exhausted.

Descriptors: (*Economics, New Mexico), (*New Mexico, Economics), (*Recreation, Economics), Industries, Civil engineering, Commerce, Costs, Employment, Traffic, Roads, Lakes.

Identifiers: Area redevelopment, Indian reservations, Tourist industry, Recreation facilities.

There is no single tourism market upon which the Tribe can depend completely. Therefore, it must develop tourism based on a combination of markets: in-transit highway traffic, both business and pleasure; convention delegates visiting Albuquerque; local tourists and recreationists; and vacationers looking for first-class facilities on water. To take advantage of this combined market a first-class vacation-inn of about 120 rooms is needed near U.S. Highway 66 and Albuquerque. Fortunately, a section of the eastern part of the Reservation (Sedillo Grant) may provide these requirements. Indications are that a combination of two to five lakes could be created here, ranging in size from 83 to 400 surface acres. It will cost approximately $2.3 million for site and lake development and improvement work, and every effort should be made to finance such work through various kinds of grant funds. A 120-unit vacation-inn built on such an improved site would cost about $1.5 million. Of this $1.5 million, roughly two-thirds might be obtained from Federal agencies in the form of long-term, low-interest loans. The balance would have to be provided primarily from private sources.

PB-170 263 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Bureau of Outdoor Recreation, Washington, D. C.
TOURIST AND RECREATION POTENTIAL EASTERN KENTUCKY.
Apr 63, 63p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Recreation, Economics), Rural areas, Natural resources, Commerce, Site selection, Roads, Floods, Control, Water supplies.

Identifiers: Area redevelopment, Recreation facilities, Tourist industry, Reservoirs, Fish and Wildlife.

The Eastern Kentucky area has an excellent potential to share in the Nation's future growth in tourism and recreation. However, several important obstacles must be overcome and adjustments made to realize these potentials. First and foremost is the development of critically needed highways. A second major need is for more adequate flood control and the rapid completion of authorized or proposed flood control reservoirs. To be of maximum use, however, these reservoirs should provide for such features as water pollution control, fishery management, municipal and industrial water supply, and properly developed recreational facilities and area, with good access. Additional items needed in Eastern Kentucky to maximize the area tourist-recreational potentials are (1) the construction of many more quality-type commercial facilities (lodging accommodations and food services) throughout the area; (2) greater development of the area's water and fish and wildlife resources; (3) expansion of the public forest holdings; (4) expansion of park facilities and roads to include many more camping facilities, additional lodgings, more parking lots, hiking trails, etc.; (5) upgrading the appearance of the area; and (6) creating an 'Eastern Kentucky' image. (Author)

PB-170 264 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Georgia Inst. of Tech., Atlanta. Industrial Development Div.
AUDIT AND EVALUATION OF RETAIL AND WHOLESALE TRADE ACTIVITIES IN CARROLLTON AND CARROLL COUNTY, GEORGIA,
by Charles H. Sewell. Dec 62, 37p Technical rept. TR-3
Proj. A-619

Descriptors: (*Economics, Georgia), (*Georgia, Commerce), (*Commerce, Georgia), Population, Urban planning.

Identifiers: Area redevelopment, Shopping centers.

The future growth of both retail and wholesale trade in Carrollton depends upon its development as a major shopping center for nearby west Georgia and east Alabama counties. The Merchants' Association should be revitalized and supported by local merchants. There must be an organization to coordinate a unified, aggressive approach to trade stimulation. A general cleanup of the business district would result in an improved attitude of local customers and much more interest on the part of nonresident shoppers. The community should take immediate steps to enlarge available parking facilities. Local officials should give early consideration to the need for a thorough study of the central business district with a view towards planning requirements for the future.

PB-170 265 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Georgia Inst. of Tech., Atlanta. Industrial Development Div.
AUDIT AND EVALUATION OF PARK AND RECREATION FACILITIES IN CARROLLTON, GEORGIA,
by Thera H. Richter. Nov 62, 36p Technical rept. TR-2
Proj. A-619

Descriptors: (*Economics, Georgia), (*Georgia, Recreation), (*Recreation, Georgia), Management engineering, Lakes, Population.

Identifiers: Area redevelopment, Recreation facilities.

Contents: Development of Recreation Program. Existing Recreational Facilities: City Recreation Areas -- Lakeshore Park and Lake Carroll, City Park, Griffin Homes Park; School Playgrounds and Playfields -- College Street Elementary School, Maple Street School Playground, Carrollton High, Carver High and Alabama Street Elementary Schools; Private Facilities -- Carrollton Country Club, Oil Companies' Ball Field. General Considerations: Objectives; Population Characteristics and Projections. Recommendations: Parks and Recreation Director; Neighborhood Parks and Playgrounds; Community Recreation Center; Recreation Facilities; Land Acquisition.

PB-170 271 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.75
Ohio Univ., Athens. Inst. for Regional Development.
A TECHNICAL-ECONOMIC EVALUATION OF A POTENTIAL RECREATION DEVELOPMENT IN MONROE COUNTY, OHIO.
Aug 65, 36p

Descriptors: (*Economics, Ohio), (*Ohio, Recreation), (*Recreation, Ohio), Rural areas, Feasibility studies, Geology, Site selection,

Management planning, Lakes, Rivers, Commerce, Costs.

Identifiers: Area redevelopment, Recreation facilities.

It is recommended that one of the three Sunfish Creek sites mentioned in the results of Phase I be chosen for a recreation lake in Monroe County. The development of the area should begin as soon as possible. It is recommended that the developed area be centered around a specific theme involving the 'Switzerland of Ohio' and a unique narrow gauge railroad. Specific recommendations include parking cars at a rail head and commuting to and from the recreation use areas. A resort area should be developed. This would include a rustic lodge and cabins designed to accommodate 3,500 vacationing families (for one week or more per family) with added facilities for a maximum of 30,000 weekend visitors per season. Buildings should have a Swiss or Tyrolian design. The construction of recreation facilities such as tennis courts, driving ranges, a golf course, boat docking, boat rental areas, a beach, nature center and/or a museum, camping sites, picnic areas, archery or rifle range, a children's area or other similar structures should be built to entertain and provide relaxation for the vacationing families in the area. Besides providing a recreational experience, these facilities would represent a substantial source of income to the eventual developers. (Author)

PB-170 272 **Field 5C, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Area Redevelopment Administration, Washington, D. C.
OPPORTUNITIES FOR ECONOMIC GROWTH IN PEND OREILLE COUNTY, WASHINGTON.
15 Jul 63, 20p

Descriptors: (*Economics, Washington (State)), (*Washington (State), Industries), (*Industries, Washington (State)), Rural areas, Employment, Recreation, Wood, Processing, Concrete, Agriculture, Commerce, Dams, Bridges, Limestone, Silicon compounds, Dioxides, Sand, Site selection, Boats, Population, Training, Minerals.

Identifiers: Area redevelopment, Marina, Tourist industry.

The following recommendations are proposed: (1) Investigate the possibility of locating the Holodec Corporation, manufacturer of pre-stressed concrete laying machines, in Newport. (2) Assist the International Stone Company with its plans to locate in the county, including assistance in selecting a site having tourist-attraction possibilities. (3) Explore the feasibility of developing a marina at Newport and improving boating facilities in the Pend Oreille River reservoir area. (4) Check on the possibilities of expanding existing wood-processing industries. (5) Survey and evaluate tourist attractions, facilities and recreational sites in the area, with a view to increasing the tourist trade from the Spokane Metropolitan area. (6) Examine the possibilities for production of seed potatoes and other crops for the Columbia Basin and Spokane markets; investigate further the potentialities for developing high-grade lime, silica sand and other minerals for commercial use; develop plans for the subsequent use of housing of construction workers brought in to build the dam and bridge on the Pend Oreille River. (7) Explore training possibilities.

PB-170 277 **Field 5C, 8F, 2B**
CFSTI Prices: HC$2.00 MF$0.50
First Research Corp., Miami, Fla.
OVERALL ECONOMIC DEVELOPMENT PROGRAM KENTUCKY RIVER FOOTHILLS PROGRAM EVALUATION AND RECOMMENDATIONS FOR ACTION.
Oct 62, 40p
Contract Cc-5920

Descriptors: (*Economics, Kentucky), (*Kentucky, Industries), (*Industries, Kentucky), Forestry, Wood, Processing, Agriculture, Urban planning, Natural resources, Recreation, Employment, Urban areas, Rural areas, Population, Minerals.

Identifiers: Area redevelopment, Tourist industry, Wood industry.

CONTENTS: Kentucky River Foothills OEDP: Review; Field Survey. Recommendations for Action: (1) Forest-Based Industries; (a) Wood Harvesting, Processing and Handling Industries; (b) Finished Wood Products; (2) Agribusiness; (3) Mineral-Associated Industries; (4) Community Development As An Impetus to Industry; (5) Tourism. Step-by-step plan for the local OEDP: Organization; Executive Secretary; Committee Appointments; Preparation of the Comprehensive OEDP Report; The Continuing Program; Prepare Brochures.

PB-170 283 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Caudill, Rowlett and Scott, Houston, Tex.
FEASIBILITY STUDY OF INTERNATIONAL TRADE TOURIST - CONVENTION AND CULTURAL FACILITIES, LAREDO, TEXAS.
Apr 63, 63p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Texas), (*Texas, Recreation), (*Recreation, Texas), Culture, Commerce, Urban planning, Employment, Feasibility studies, Costs.

Identifiers: Tourist industry, Area redevelopment, Recreation facilities.

The Laredo International Center will provide for the pleasure and economic betterment of the people of Laredo. Upon completion of phase one, it is estimated that 261 new jobs, $1,277,600 in additional payroll, and $10,160,000 in working capital will be added to the local economy. Proposed for future development, centers for sports, field events and education would be located in the Fort McIntosh-Laredo Junior College area. The outdoor theater, art, and historic restoration area are proposed south of the central business district along the river. A major conclusion of this study is that upon completion of Phase One (auditorium-convention hall), the future of Laredo's public development potential and attraction lies on the banks of the Rio Grande. The already-present historical atmosphere and physical connection between the United States and Mexico should not only be preserved, but enhanced by the development of other tourist, trade, and cultural facilities. Coordinated action, involving urban renewal planning, public officials and private citizens is essential to the success of the Laredo International program.

PB-170 286 **Field 5C, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Candeub, Cabot and Associates, Scranton, Pa.
RECREATION PLAN FOR THE MAUCH CHUNK CREEK WATERSHED PROJECT STAGE 1 CARBON COUNTY, PENNSYLVANIA.
May 65, 31p

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Recreation), (*Recreation, Pennsylvania), Site selection, Costs, Management planning, Water supplies, Rivers.

Identifiers: Area redevelopment, Recreation facilities, Reservoirs.

This report and accompanying data indicate that the proposed undertaking of a first stage recreation area embracing 100 acres can be reasonably developed within the given budgetary allowances. It must be noted that the estimates developed in this report have only been made to determine approximate costs and will need to be finalized at a later date. The development of these plans have been designed to serve as a guide to the actual development of such recreational facilities as well as to serve as a coordinating element to the total development of the entire site. Major recreational facilities proposed for the first stage of development include a picnic area, beach and swimming area, organized game area, boating area, and tent and trailer camp site areas. These recreational facilities will be supplemented by parking facilities, access drives, water and sanitary facilities, shelter house, entrance building, trails, signs and markers. (Author)

PB-170 287 **Field 5C, 13I**
CFSTI Prices: HC$2.00 MF$0.50
Brooks (Leslie) and Associates, Inc., Tulsa, Okla.
OIL WELL DRILLING BIT TESTING PROGRAM.
Final rept.
1966, 42p
Rept. on Phipps Drill Bit Testing Program. Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Petroleum industry), (*Drills, Performance (Engineering)), Petroleum industry, Drilling, Effectiveness, Tests, Costs, Experimental data, Commerce, Fuels.

Identifiers: Area redevelopment.

The Phipps type PP drill bit in its present form is not a marketable product for oil and gas well drilling. Under certain rotary percussion hammer conditions the Phipps bit will drill at a rate approaching that of more conventional bits. However, conventional bits are less expensive than the projected cost of the Phipps bit, requiring that the Phipps bit drill at a superior rate in order to demonstrate economic feasibility to the prospective customer. Under standard rotary conditions, competitive bits drill much faster than do Phipps bits. (Standard rotary does not utilize the percussion hammer principle. 98% to 99% of all oil and gas well footage drilled by rotary rigs employs the 'standard rotary' technique currently and will continue to do so in the foreseeable future.) There is an apparent reluctance among oil companies and drilling contractors to try a new bit design more than one time in case the first bit does not drill at a satisfactory rate. Also, oil men tend to accept test results made by others. (Author)

PB-170 288 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Program Research, New York.
REPORT ON A TOURISM DEVELOPMENT PROGRAM JACKSON, KENTUCKY.
Nov 64, 60p
Prepared in cooperation with Area Redevelopment Administration, Washington, D. C.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Recreation, Economics), Feasibility studies, Costs, Culture, Museums, Employment, Commerce, Plants (Botany), Mountains, Education, Natural resources.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

Summary: (1) One major drawback to the tentative plan for development is its lack of a central theme. Emphasis has been divided among several ideas for tourist attractions. In doing so, each loses in importance and potential impact. A number of minor attractions do not add up to one major attraction. Another drawback to the plan is the apparent lack of a clear concept of a tourist complex, the needed balance between the type and size of accommodatoions and tourist facilities. (2) In place of the tentative plan, the suggestion is made that the community of Jackson create an arborentum of substantial size and significance having as its objective 1) the eternal preservation of native plants of the Kentucky Mountains, 2) the entertainment, recreation, and instruction of people, and 3) the training of youth. Supplementing the

arboretum should be sufficient accomodations to take care of visitor needs. (3) As envisioned, the proposed development should attract approximately 250,000 people a year into the Jackson area. (4) Development costs are estimated to be in the neighborhood of $2,300,000. Several years will be required to get the program underway, but once the operations are in full swing total gross receipts are estimated to be around $1 million.

PB-170 290 **Field 5C, 11L, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Prentice Engineering and Contractors, Portland, Oreg.
FEASIBILITY STUDY OF ANGELINA COUNTY, TEXAS, SOUTHERN PINE PLYWOOD.
1 Aug 63, 39p Rept. no. p463-2
Contract Cc-6011

Descriptors: (*Economics, Texas), (*Texas, Industries), (*Plywood, Industries), Feasibility studies, Plywood, Industrial plants, Production, Costs, Wood.

Identifiers: Area redevelopment, Wood industry.

The establishment of a plywood plant to produce sheathing grades of plywood from southern pine species logs is technically and economically feasible. Although consideration has been given only to unsanded sheathing grades of plywood, it is quite obvious that there is considerable room for expansion into sanded sheathing grades. Production capacity of the plant outlined in this study could be readily increased with equipment modifications and additions only. The log supply available is more than sufficient to handle such expansion. (Author)

PB-170 291 **Field 5C, 8F**
CFSTI Prices: HC$4.00 MF$0.75
Program Research, New York.
REPORT ON THE JANE TODD CRAWFORD PARK PROJECT AND TOURISM DEVELOPMENT POTENTIALS GREEN COUNTY, KENTUCKY.
Jun 65, 102p
Contract C-163-65
Availability: Original document in color until exhausted.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Recreation, Economics), (*Equines, Training), Costs, Employment, History, Feasibility studies, Transportation, Roads, Population.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities.

In view of market and income restrictions, preliminary plans for the Jane Todd Crawford Memorial Park as proposed by the Green County Historical Society do not appear to be economically feasible. An alternate concept of development is recommended. Exploitation should be made of the world of horse training and horsemanship for which Kentucky is renowned. To do so, the suggestion is made that an equestrian school, a school of training for both rider and horse, be established and operated in conjunction with luxury resort facilities. The development program should take into consideration (1) that the building up of the stables and horse line has to start early; (2) that the people who are to be charged with developing the program should come in the picture at the beginning; and (3) that the Equestrian School Development should precede that of the resort. Total development costs for the dual project, including land acquisition, are estimated to be $2,709,272. Full operations are estimated to commence within three years of the start of the program. By the fifth year, gross annual income should reach an estimated $1 million.

PB-170 307 **Field 5C, 13B, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Klein and Saks, Washington, D. C.
ECONOMIC GROWTH OPPORTUNITIES IN ASHTABULA COUNTY, OHIO AND RECOMMENDED PROGRAM FOR THEIR DEVELOPMENT.
Follow-up rept.,
by Richard L. Davies. 10 Jan 66, 12p
Contract EDA-C-97-65

Descriptors: (*Economics, Ohio), (*Ohio, Economics), (*Industries, Ohio), Labor, Employment, Urban planning, Commerce, Management engineering, Transportation, Airports, Training, Wood, Steel industry, Warehouses, Shipping (Marine), Industrial plants, Distribution (Economics).

Identifiers: Area redevelopment.

The second phase of the work, from July 8th, 1965 to January 8th, 1966, has now been completed. The project has produced the following results in Ashtabula County. 1) Industrial expansion and greater employment, 2) Improved intergroup cooperation for common needs, 3) An ongoing economic development program.

PB-170 308 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.50
Horwath and Horwath, New York.
CONVENTION AND EXHIBITION CENTER TOLEDO, OHIO.
Final rept.
1966, 57p
Contract C-302-65 (NEG),
Proj. 1006

Descriptors: (*Economics, Ohio), (*Ohio, Economics), (*Buildings, Urban planning), (*Urban planning, Economics), Employment, Culture, Display systems, Recreation, Costs, Feasibility studies, Symposia, Commerce.

Identifiers: Area redevelopment, Convention center.

Contents: Chapter I - The Assets of Toledo; Economic Factors; Chapter II - The Need for Facilities; Chapter III- Cultural Facilities in Toledo; Chapter IV - The Need for a New Sports Arena; Chapter V - Possibility of a Trade Center Building; Chapter VI - Potential Sites; Chapter VII- Suggestions on Convention Center Building and Estimated Construction Costs; Chapter VIII - Projection of Convention Center Estimated Annual Operating Results; Chapter IX - Economic Impact on Toledo.

PB-170 315 **Field 5C, 6H, 8A, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Maine Dept. of Sea and Shore Fisheries, Augusta.
SOFT CLAM DEPURATION STUDIES. SURVEY OF SHELLFISH GROWING AREAS (YORK COUNTY),
by Donald M. Harriman, and Bradford S. Sterl.
Sep 64, 24p

Descriptors: (*Economics, Maine), (*Maine, Seafood), (*Seafood, Maine), (*Shellfish, Purification), Pelecypoda, Growth, Rivers, Estuaries, Water pollution, Sea water, Industries, Sanitary engineering, Population, Industrial plants, Costs.

Identifiers: Food industry.

The principal conclusion to be drawn from this survey is that at present there are not enough clams in moderately polluted areas to support a clam depuration plant for York County. There are a few areas which could contribute to such a plant. Oysters in the Piscataqua River offer the greatest possibility for economic development, and the method of use should be carefully considered. The standing crop has a value of close to a quarter-million dollars if it could be harvested and sold. Three possibilities exist for this resource: (1) wait for pollution abatement to release it again to a wild fishery; (2) relay oysters to clean bottom for cleansing; or (3) a seed oyster industry might be developed. Depuration of these oysters in a cleansing plant is not feasible at this time because of the high levels of contamination. Summary and conclusions: (1) A clam resource survey indicates approximately 10,000 bushels. (2) There are insufficient concentrations of clams to support a depuration plant in York County at this time. (3) There is a potentially valuable oyster resource in the grossly polluted Piscataqua River. (4) Piscataqua River oysters can be cleansed by relaying in pure, higher saline waters.

PB-170 317 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Johnson, Horrigan and Yaple, Erie, Pa.
A SURVEY OF INDUSTRIAL PARK SITES IN THE GREATER POTTSVILLE AREA SCHUYLKILL COUNTY, PENNSYLVANIA.
Apr 66, 52p

Descriptors: (*Economics, Pennsylvania), (*Pennsylvania, Industries), (*Industries, Site selection), Transportation, Water supplies, Sewage, Sanitary engineering, Power supplies, Coal, Employment, Mining engineering, Industrial plants, Roads, Communication systems, Natural resources.

Identifiers: Area redevelopment, Industrial parks.

It has been shown that Pennsylvania Route No. 61 is now, and probably in the future will continue to be, the major highway link from the Greater Pottsville Area to express highways leading to major centers of population in the northeastern United States. It also represents the major internal highway within the Area. Parallel and close to Pa. No. 61 run the major railroad lines serving the area. The major natural gas transmission line providing that important service to the area follows the same route. Water distribution facilities of the Schuykill County Municipal Authority parallel Pa. No. 61 from the Borough of St. Clair south through the City of Pottsville toward Cressona. Finally, Pa. No. 61 connects virtually all of the centers of population within the area. It is for these reasons that sites for potential planned industrial districts have been sought near and accessible to this highway. The number of desirable sites meeting this primary criterion and which appear to be reasonably available is limited. Therefore, other sites with less desirable locational characteristics have necessarily been included in this study. The preliminary site selection included: (1) Frackville Industrial Park; (2) St. Clair yard; (3) Kunl Farm site; (4) Colitz site; (5) Wildermuth site, and (6) Deer Lake site. (Author)

PB-170 322 **Field 5C, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Chambers and Campbell, Inc., Albuquerque, N. Mex.
TOURISM AND RECREATION DEVELOPMENT PLAN FOR THE ZUNI-CIBOLA TRAILS AREA NEW MEXICO AND ARIZONA.
Final rept.
Sep 65, 164p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Recreation), (*Arizona, Economics), (*New Mexico, Economics), (*Recreation, Economics), Roads, Commerce, History, Natural Resources, Culture, Water supplies, Employment, Forestry, Lakes, Museums, Transportation, Costs.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Indian reservations.

Development of the area's only unique tourism resource--its history and pre-history--is suggested as a means for attracting and holding the interest of prospective visitors to the area. The existing Indian cultures and the region's scenic land forms and natural vegetation must also be considered

important tourism resources of the area. In addition, the reallocation of a portion of the water resources of the Zuni Reservation to recreational purposes is recommended. The needs and wants of the general tourist engaged in 'passive' pursuits such as sightseeing, however, form the framework within which the market determinations for the area are made. Analysis of the existing and potential tourist market as measured by visitation to sites within the area and the volume of tourist traffic indicate that if attractions and facilities are developed along the lines recommended, visitation to the area may be expected to increase by a factor of more than two and one-half by 1975. Estimates for 1964 indicate that about 55 percent of the travelers were non-local (that is, they required lodging for the night); by 1975 it is estimated that non-local visitation will account for 60 percent of the total due to increasing national significance of the area. Projected sales of tourist-oriented establishments will approximate $500,00 by 1975. Nearly fifty jobs will be created by the proposed tourism 'industry'. (Author)

PB-170 323 **Field 5C, 8F**
CFSTI Prices: HC$7.00 MF$1.50
Utah Univ., Salt Lake City. Bureau of Economic and Business Research.
TOURISM IN UTAH. A STUDY OF TOURISM AND RECREATIONAL POTENTIAL IN SELECTED UTAH COUNTIES,
by William M. Stewart, and Katherine L. Lueck.
Apr 66, 321p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Utah), (*Utah, Economics) (*Recreation, Economics), Feasibility studies, Roads, Traffic, Natural resources, Mountains, Lakes, History, Climatology, Water, Costs, Geology, Transportation, Deserts, Forestry.

Identifiers: Area redevelopment, Tourist industry, Recreation facilities, Fish and wildlife, Indian reservations.

Contents: Tourism in Western States. Tourism in Utah: Centricity; Intervening Resources; Characteristics of Utah tourists; Traffic and Access; Tourist Attractions; Utah's Recreation-Tourism Image. Canyonlands (San Juan County). Castle Country (Carbon and Emery Counties). Scenic drives: Garfield County; Beaver County; Juab County; Sanpete County. Treasure Mountains Regions: Duchesne County; Summit and Wasatch Counties. Key Projects: Canyonlands Resort; Hidden Valley Ranch Camp; Lake Creek Recreation Center; Boulder King Ranch; Troll Hagen; Indian Heritage Park. Appendices: Forecast of Demand for Recreation in the Canyonlands Region (San Juan County); Investment Opportunities with U. S. National Park Service; Forecast of Demand for Recreation in the Treasure Mountains Region. (Author)

PB-170 324 **Field 5C, 6H, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Marine Chemurgics, Inc., Morehead City, N. C.
CARTERET COUNTY SEAFOOD PROCESSING PROJECT. PART 1,
14 Mar 66, 99p
Contract Cc-6161,
Proj. 777

Descriptors: (*Economics, North Carolina), (*North Carolina, Seafood), (*Seafood, North Carolina), (*Industries, North Carolina), Commerce, Labor, Processing, Packaging, Life expectancy, Storage, Employment, Transportation, Distribution (Economics), Fishes, Freezing, Frozen foods.

Identifiers: Area redevelopment, Food industry.

The seafood fishery of Carteret County, N. C. represents a substantial portion of North Carolina landings, and is a mainstay in the local economy. This study was initiated because the fishery has failed to provide adequate employment. The project was intended to determine if there are sufficient and suitable raw materials for processing endeavors. Existing facilities which might be used for this purpose, the techniques of producing and storing the products, the physical, financial and marketing requirements, along with employment prospects, were to be estimated. Based on surveys it was suggested that seafood companies having buildings, refrigeration, trucks, boats, and most important, part-time employees, should establish compact and sanitary processing facilities on their own premises. A prototype plant was constructed to provide a practical demonstration of what is involved in setting up processing facilities. The activities of this demonstration plant were based on freezing techniques because plate or blast freezing methods offer preservation measures which can be considered by small operations. About 40% of the retail price is available for the steps from vessel to retail outlet or restaurant. As proposed, processing rooms would be operated in a number of wholesale fish handling facilities; with emphasis on strict and uniform specifications for freshness, processing and packaging methods, and control of storing and shipping temperatures at below 01F. Marketing would be undertaken jointly with other dealers (processors) to provide more dependable supply and income for promotion. (Author)

PB-170 325 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Horwath and Horwath, New York.
AMERICAN MUSEUM OF ELECTRICITY AT NISKAYUNA, SCHENECTADY COUNTRY, NEW YORK.
Final rept.
1965, 81p
ContractC-231-65 (NEG)
Proj. 803
See also PB-170 326.

Descriptors: (*Economics, New York), (*New York, Museums), (*Museums, Economics), (*Electricity, Museums), Education, Employment, Costs, History, Industries, Feasibility studies, Population, Transportation, Roads.

Identifiers: Area redevelopment, Recreation facilities.

The purpose and concept of the proposed American Museum of Electricity and the plans for development of the site are in line with current museum concepts; however, the following aspects of the proposals are extravagant: (1) Site development, particularly parking, will be very expensive. (2) The several buildings should be set much more closely together to avoid the need for expensive covered walkways. (3) The outdoor amphitheater does not appear justified in view of the short season. (4) Providing bus service from the parking lot will add to the annual operating cost, but would appear necessary unless the lots are located closer to the museum. (5) The concept of a highly participational museum is sound, but very expensive. Unless the major exhibits are donated and annual oprerating costs endowed, the total project cost cannot be financed by normal methods. It is estimated that a cumulative total of 37,483,000 visits will be made to the proposed American Museum of Electricity over the 31-year period from opening in 1968 to 1998. Revenue, including rental of space occupied by the industrial exhibits, should be adequate to cover operating expenses and the estimated debt service. The museum would appear to be economically feasible on the basis of the assumptions made. (Author)

PB-170 326 **Field 5C, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Horwath and Horwath, New York.
AMERICAN MUSEUM OF ELECTRICITY AT NISKAYUNA, SCHENECTADY COUNTY, NEW YORK.
Final rept.
1965, 10p
Contract C-231-65 (NEG),
Proj. 803

Descriptors: (*Economics, New York), (*New York, Museums), (*Museums, Economics), (*Electricity, Museums), Education, Employment, Costs, History, Industries, Feasibility studies.

Identifiers: Area redevelopment, Recreation facilities.

The stated purposes of the American Museum of Electricity, Inc. are: To collect, preserve and exhibit a record of the historical development of electrical science and technology, and to perform such scholarly research and teaching as may serve these further purposes; To create a greater understanding of the role of electrical science and technology in the development of modern society; To bring about a greater appreciation of the contributions of men and of institutions to the discovery, investigation and utilization of electricity; and Through the example of electricity, to illuminate the interaction of science and technology with the advancing culture of which they are a part. Over the 31-year period following the opening of the proposed museum, it is estimated that the visitors attracted by it to the area would generate spending of a total of $154.9 million, resulting in the creation of 437 new jobs in the museum and in the tourist service industries. An additional 123 jobs would be created in other supporting industries bringing the total to 560 by 1997. The greatest impact upon the local economy from visitors to an area is in the retail service categories of lodging and eating places, recreation and automobile services. (Author)

PB-170 327 **Field 5C, 6H**
CFSTI Prices: HC$2.00 MF$0.50
Hawaii State Dept. of Planning and Economic Development, Honolulu.
FEASIBILITY OF PROCESSING TROPICAL FRUIT CONCENTRATES IN PUNA, HAWAII.
Jun 65, 48p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Hawaii), (*Hawaii, Economics), (*Fruits, Beverages), Feasibility studies, Processing, Dehydrated foods, Pectins, Costs, Concentration (Chemistry), Food, Industries.

Identifiers: Area redevelopment.

A pilot plant operation to determine the feasibility of processing tropical fruits with acerola plant equipment was a definite success. The technicians who carried out the pilot plant operation have concluded it is technically possible to produce high quality concentrates from passion fruit, guava and papaya on a commercial scale. No serious technical problems were encountered in the operation. In making these concentrates, the technologists attempted to get the highest brix reading possible instead of stopping at a lower and possibly more practical level of concentration. Subsequent product development work by the technologists proved satisfactory products could be made utilizing these concentrates. These products were jams, jellies, nectar bases, 2nd flavorings. An economic analysis of a projected full-scale commercial operation resulted in a very optimistic profit picture. These results apply only to the Puna District of Hawaii which offers unique advantages to the proposed operation. (Author)

PB-170 329 **Field 5C, 11L, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Bovay Engineers, Inc., Spokane, Wash.
MARKET AND FINANCIAL FEASIBILITY OF KALK INDUSTRIES FINGER-JOINTING PROJECT COLVILLE, WASHINGTON.
Jun 65, 44p
Contract P-6168-5

Descriptors: (*Economics, Washington (State), (*Washington (State), Industries),

(*Wood, Industries), Joining, Industries, Costs, Commerce, Feasibility studies, Commerce, Labor, Transportation.

Identifiers: Area redevelopment, Wood industry, Raw materials.

This study examines the feasibility of the market and financial positions as proposed for Kalk Industries' Finger-Jointing Project in Colville, Washington. The project consists of a new concept of salvaging short lumber from sawn slabs gathered at various sawmills in the area. This lumber is to be dried, trimmed selectively, finger-jointed, and end-glued to custom lengths as required. The methods envisioned are unique, and are dealt with separately. A map of the study area is included. Supporting papers, such as the capital cost estimate, a pro-forma operating statement, and others included in the Appendix, were reviewed. Certain selected parts of the proposal were checked with existing operators of end-gluing equipment. Provided that this report's interpretation of the proforma operating costs, and the interpretation of the income information is correct, the Kalk proposal is marginal. If it can be demonstrated that the selling prices can be raised to $90.00 or $100.00/MFBM for mill-run product, there might be some encouragement. There is also the condition of insufficient raw material within economic recovery or hauling distance. Raw material availability and cost is the limiting factor. (Author)

PB-170 330 **Field 5C, 11B, 13H, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Spindletop Research, Inc., Lexington, Ky.
DEVELOPMENT OF HIGH STRENGTH HOTEL CHINAWARE. PART I. LABORATORY STUDY AND INVESTIGATION.
Final rept.,
by C. H. Commons Jr., J. H. Healy, and W. A. Lambertson. Dec 65, 84p
Contract Cc-6133
See also PB-170 331.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Ceramic materials, Kentucky), Clay, Particle size, Extrusion, Sintering, Rupture, Water vapor, Microstructure, Heat treatment, Hot working.

Identifiers: Area redevelopment.

The object was to develop high strength ceramic body compositions and processes using Kentucky ball clay. The study included fabrication and testing of ceramic pieces to permit competitive evaluation with dinnerware pieces now being sold. The scope of the project involved a survey of literature on the subject, followed by fabrication and testing. The bodies developed have high strength, high ball clay content, fine particle size, freedom from crystal inversion stresses, near theoretical density (relative freedom from porosity), and glassy phase with lower thermal expansion than the major crystalline phase. (Author)

PB-170 331 **Field 5C, 11B, 13H, 8F**
CFSTI Prices: HC$5.00 MF$1.00
Spindletop Research, Inc., Lexington, Ky.
DEVELOPMENT OF HIGH STRENGTH HOTEL CHINAWARE. PART II. MARKETING AND ECONOMIC FEASIBILITY.
Final rept.,
by E. L. Purlee, W. R. Reeves, and W. C. Inman. Dec 65, 151p
Contract Cc-6133
See also PB-170 330.

Descriptors: (*Economics, Kentucky), (*Kentucky, Economics), (*Ceramic materials, Kentucky), Feasibility studies, Labor, Costs, Money, Commerce, Clay.

Identifiers: Area redevelopment.

CONCLUSIONS: A substantial market exists for high-strength commercial dinnerware. About one-third of all commercial dinnerware in use would be high-strength dinnerware within three years after introduction of the new product. The greatest appeal of high-strength commercial dinnerware will most likely be its resistance to breakage. Breakage is an important problem to users. Both dealers and users ranked chipping, cracking, and scratching (in that order) as important factors of breakage. No serious technological problems are foreseen in the commercial application of the process developed for high-strength dinnerware. Companies now manufacturing commercial dinnerware could manufacture the new high-strength dinnerware with little change in their present equipment. A new plant, designed and constructed for the purpose of manufacturing the new high-strength dinnerware, would be a successful economic venture. (Author)

PB-170 333 **Field 5C, 5A, 8F, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Southern Interstate Nuclear Board, Atlanta, Ga.
APPLICATION OF NUCLEAR-SPACE SCIENCES TO INDUSTRY TO INCREASE EMPLOYMENT IN THE CHARLESTON, WEST VIRGINIA METRO-AREA,
27 Jun 65, 42p
Contract C-86-65

Descriptors: (*Economics, West Virginia), (*West Virginia, Industries), (*Industries, West Virginia), (*Nuclear industrial applications, West Virginia), Employment, Industrial research, Rocket research, Space flight, United States Government, Scientific research, Management engineering.

Identifiers: Area redevelopment, Industrial applications, Space research, Space technology industrial applications.

In actuality, industry--particularly small industry--is not generally inclined to initiate production innovations or processes involving new technology without some outside stimulation. It is believed that the vast resources of AEC and NASA will not be utilized without more definite government programs at the federal and state levels, and state levels, and a continuing and direct assistance on an in-plant basis will be required. Governor Smith has moved to establish the Nuclear and Space Technology Applications Unit in West Virginia. The AEC, NASA, and U. S. Department of Commerce should move to establish working relationships with the State of West Virginia to achieve the perpetuation phase of this project, and it is recommended that a pilot project covering one year of activity funded by the EDA be considered. Major corporations and other large companies in the project area should be organized to assimilate such technology and assist the neighboring smaller companies to use it. This experimental project should be repeated in other states. In all efforts at technology utilization, more and better use should be made of in-plant surveys, technology application briefings and special demonstrations at Federal installations. A regional program should be developed within the President's Appalachian Commission to meet objectives and conditions represented by this project. (Author)

PB-170 334 **Field 5C, 13B, 8F**
CFSTI Prices: HC$6.00 MF$1.25
Corplan Associates, Chicago, Ill.
AN ECONOMIC DEVELOPMENT STUDY FOR MOSES LAKE, WASHINGTON.
Final rept.
Mar 66, 268p
Proj. Q-6021
Availability: Original document in color until exhausted. Prepared in cooperation with Economic Development Administration.

Descriptors: (*Economics, Washington (State)), (*Washington (State), Economics), (*Urban planning, Washington (State)), (*Industries, Washington (State), Employment, Terminal flight facilities, Buildings, Housing, Site selection, Military facilities, Recreation, Industrial plants, Management planning, Costs, Agriculture, Food.

Identifiers: Area redevelopment.

I. Major assets of Moses lake: The Community Spirit and Government of Moses Lake Are Among Its Greatest Assets; Larson Air Force Base Facilities Are Unique, Enormous, and in Excellent Condition; The Economic Base of Moses Lake Is Primarily Agriculture; Living Conditions in Moses Lake Are Attractive. II. Problems: Moses Lake Community Leaders Must Consider the Time Requirements for Sound Economic Development and Adjust Their Community Action Program to Provide for the Needed Time; Moses Lake Market Area is Restrictive to Most Industries; Moses Lake Will Have a Severe Unemployment Problem by March of 1966. III. Summary of major recommendations: Moses Lake Must Develop a Means to Operate, Develop, and Promote Larson Base Facilities; Moses Lake Should Capitalize on One of Its Greatest Assets--Recreation; Moses Lake Should Capitalize on Its Agricultural Industry Through the Development of Related Industries; Moses Lake Should Develop the Interest of Federal and State Governments in the Larson Facilities.

PB-170 336 **Field 5C, 8F**
CFSTI Prices: HC$3.00 MF$0.50
Georgia Inst. of Tech., Atlanta. Industrial Development Div.
A PROGRAM OF TECHNICAL ASSISTANCE FOR THE INDUSTRIAL DEVELOPMENT OF CARROLL COUNTY, GEORGIA.
Final rept.,
by Jerry L. Lewis, and Jerry O. Bange. Feb 66, 52p
Contract Cc-5911,
Proj. A-619,

Descriptors: (*Economics, Georgia), (*Georgia, Industries), (*Industries, Georgia), Site selection, Commerce, Education, Urban planning, Labor, Agriculture, Roads, Employment, Water supplies, Sanitary engineering, Recreation, Costs.

The report reviews and summarizes the activities, accomplishments, and findings of a three-year research and technical assistance project conducted in Carroll County, Georgia, by the Industrial Development Division of Georgia Tech's Engineering Experiment Station. The project was sponsored by the Area Redevelopment Administration of the U. S. Department of Commerce, with local support provided by the Carroll County Development Corporation. The purpose of this project was to demonstrate the results which could be achieved through the intensive application, over a three-year period, of an interdisciplinary research and technical assistance program designed to (1) systematically audit Carroll County's economic resources, (2) identify and eliminate obstacles to more rapid industrial growth in the county and (3) identify and exploit opportunities to develop new payrolls, either through the expansion or diversification of existing firms or the attraction of new industry.

PB-170 338 **Field 5C, 13B**
CFSTI Prices: HC$2.00 MF$0.50
Special-Market Resources, Washington, D. C.
A PROGRAM OF TECHNICAL ASSISTANCE FOR SELECTED SMALL BUSINESSES IN SOUTH BEND, INDIANA.
1965, 45p
Contract C-90-65

Descriptors: (*Economics, Indiana), (*Indiana, Commerce), (*Commerce, Indiana), Employment, Population, Management planning, Urban areas, Costs, Industries.

Identifiers: Area redevelopment, Negroes, Small businesses.

The Technical Assistance Project had two major objectives. The first was to assist selected small

businesses in South Bend strengthen and expand their operations and, consequently, to enlarge their contributions to the community as sources of employment. The second objective was to develop out of this experience any program guidelines which might be applicable to comparable situations in other cities. Although the Project was not restrictive (in fact, a large percentage of whites participated) the primary goal was to reach and assist Negroes in business. In the relatively short time of the Project's life, an increasingly widespread interest in the status of minority-operated small business was observed. Among financiers, particularly, SMR found that small business ventures owned or operated by Negroes had simply not been considered as serious investment or employment possibilities in this industry-based economy. It is reasonable to assume that the 'boost' offered through the technical assistance agency can serve as a catalyst in this direction. (Author)

PB-170 342 **Field 5C, 8F**
CFSTI Prices: HC$8.10 MF$2.25
Indiana Univ., Bloomington. Dept. of Recreation and Park Administration.
TOURIST RECREATION RESOURCES IN SOUTHERN INDIANA.
Oct 64, 510p

Descriptors: (*Economics, Indiana), (*Indiana, Economics), (*Recreation, Economics), Employment, Natural resources, Climatology, Ecology, Lakes, Rivers, Forestry, History, Population, Transportation, Roads, Traffic, Industries, Commerce.

Identifiers: Area redevelopment, Tourist industry, Fish and wildlife, Recreation facilities.

The Southern Indiana region, as described in this report, consists of forty-three counties, all of which, except Vermillion County, lie south of U. S. Highway 40. To facilitate the handling and analysis of the data, the forty-three counties were divided into five districts. The division was based upon the geographical location of the counties, their topographic similarities, their common major assets and interests in specific recreation developments. This study is intended to point out the potentialities of Southern Indiana and to indicate the developments needed if it is to attract its share of the traveling public and develop a new source of income. A subsidiary objective is to propose developments that would provide an improved county recreation climate which would attract new residents and industry. The report is divided into three parts. Part one describes Southern Indiana's physical aspects, growth, its recreation resources and present developments, considers the factors of demand and the general economic benefits that accrue through recreation developments. Part Two presents the five planning districts, each with focal points of interest, their assets, and a proposed plan of development. Part Three provides a summary of primary and secondary assets and the potential development within each county.

PB-170 343 **Field 5C, 2D, 2B, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Saunders (W. B.) and Co., Washington, D. C.
MARKETING AND DISTRIBUTION OPPORTUNITIES FOR MINNESOTA PEAT.
Dec 65, 59p
Prepared in cooperation with Economic Development Administration, Washington, D. C.

Descriptors: (*Economics, Minnesota), (*Minnesota, Economics), (*Soils, Additives), Costs, Transportation, Distribution (Economics), Soil mechanics, Packaging, Canada, Commerce, Mining engineering, Agriculture fertilizers.

The market potential available to Minnesota is relatively large. Peat producing centers in Minnesota will have to organize their marketing efforts and strategy along lines similar to those followed by the Canadian exporters and the large Michigan producers. It will be necessary to develop brand acceptance and loyalty at the retail level through distribution and local cooperative advertising. The distribution system should be organized, installed, and strictly enforced, whether brokers and/or distributors are used. Once the demand for Minnesota peat is created at the retail level, it can be sold through any marketing channel. If the stability of price and the long-term demand for sphagnum is to be developed, the selected marketing channel must be followed consistently. The sphagnum package must be attractive to the consumer and fully spell out sphagnum's greater coverage capability per bale and its soil improvement qualities and characteristics.

PB-170 509 **Field 5C, 8G, 13C, 8F**
CFSTI Prices: HC$3.00 MF$0.75
Kansas State Highway Commission.
MATERIALS INVENTORY OF MITCHELL COUNTY, KANSAS,
by Gerald Hargadine. 1965, 60p Materials Inventory rept-3
Availability: Original document in color until exhausted.

Descriptors: (*Economics, Kansas), (*Kansas, Economic geology), (*Roads, Materials), (*Materials, Roads), Limestone, Natural resources, Rock (Geology), Minerals, Maps, Geology, Sources, Gravel, Sandstone, Construction, Shale, Erosion, Surface properties, Structural properties, Silt, Sand, Clay, Water supplies.

Identifiers: Area redevelopment.

The purpose of this report is to present information pertaining to the availability, location, and nature of deposits of material for use in highway construction and similar projects in Mitchell County, and to provide a guide for materials prospecting in the county. This investigation includes all of Mitchell County. All geologic units which are considered a construction material source are mapped and described. Construction material, as used in this report, includes soft limestone which can be crushed and used as surfacing material on lightly traveled rural roads as well as granular material suitable for road construction purposes. Mineral filler of high quality is included in this term. General information concerning significant geo-engineering problems is included in this report. Because all construction material source beds are the product of geological agents, the materials inventory is based largely on the geology of the county. This enables one to ascertain the general engineering properties of the material source unit and to identify and classify each bed according to current geologic nomenclature. By adopting this nomenclature to materials inventories, a uniform system of material source bed classification is established.

PB-170 568 **Field 5C, 8F, 13B**
CFSTI Prices: HC$3.00 MF$0.75
Northeast Desalting Team, Washington, D. C.
POTENTIALITIES AND POSSIBILITIES OF DESALTING FOR NORTHERN NEW JERSEY AND NEW YORK CITY.
11 Feb 66, 96p

Descriptors: (*Economics, Desalination), (*New York, Water supplies), (*New Jersey, Water supplies), (*Water supplies, Desalination), Industrial plants, Dams, Sea water, Distillation, Costs, Optimization, Urban planning, Rivers, Rainfall, Electrodialysis, Population, Statistical data.

Identifiers: New York (City).

Desalting is a long range possibility for additional municipal water supply in the Northeast. Existing and planned facilities, however, probably are adequate for 10 to 20 years. Estimates of lead time are based upon the drought emergency ending in 1966. Large sea water desalting plants, 300 millions of gallons per day (MGD), and larger, can be built now to produce water at about one-third to one-quarter the unit production costs for existing desalting plants. Dual purpose, nuclear fueled desalting-electric plants are the most economic of the plants studied for sea water application. Large dual purpose, sea water desalting plants (300 MGD) can be built for the Northeast to supply stand-by capacity and supplemental water during a drought. They would provide increments of safe yield during critically dry periods. Average annual costs are estimated to be about $16.3 million or about $77,000 per MGD of safe yield. The Hudson River, a large and well located source of fresh water, is an alternative to desalting. Estimates available at this time indicate a cost of about $37,000 per MGD of safe yield for pumping from the Hudson. The lower Hudson River is a large source of brackish water. Desalting this brackish water is a potential alternative to either diversion from a fresh water reach of the river or desalting of sea water. Preliminary estimates indicate costs of about $67,000 per MGD of safe yield for this source. Cost estimates derived in this study are based on current desalting technology and available cost data for baseload designs. Major capital and operating cost reductions from those shown in this report are possible through designs specifically optimized for peaking operation.

PB-170 599-1 **Field 5C, 5I, 8F**
CFSTI Prices: HC$1.00 MF$0.50
Interagency Task Group on Technological Forecasting in the Federal Government, Washington, D. C.
THE ROLE OF THE FEDERAL GOVERNMENT IN TECHNOLOGICAL FORECASTING,
by Donald Schon. Jan 66, 14p
Report to the President's Committee on Manpower and the National Commission of Technology, Automation and Economic Progress. Information contained herin is for the most part also contained in PB-170 599-2.

Descriptors: (*United States Government, Economics), (*Manpower studies, Automation), (*Automation, Economics), (*Economics, Automation), Employment, Labor, Education, Technical information centers, Personnel management, Management planning, Commerce, Scientific research, Distribution (Economics), Probability, Training, Industries.

Identifiers: Forecasting.

In February 1965, an interagency task group was formed. Its purpose was to investigate the current role and the possible future role of technological forecasting in the Federal Government, with particular emphasis on the relevance of technological forecasting to manpower problems, policies and programs. Specifically, the investigation was to focus on: 1. Action points in Government at which technological forecasting might be useful and used, if available. 2. Criteria for information at those action points. 3. Current technological forecasting activities and methodologies and their adequacy to Federal requirements. From its findings, the task group recommended the establishment of municipal and regional forecasting centers, coupled to local manpower adjustment organizations and activities. It also recommended assignment to a Federal Agency of responsibility for providing national data, trend and policy inputs to these local centers; for co-ordinating their activities, and for developing and evaluating forecast methodology for broad use in the Federal Government. (Author)

PB-170 599-2 **Field 5C, 5I, 8F**
CFSTI Prices: HC$6.00 MF$1.50
Interagency Task Group on Technological Forecasting in the Federal Government, Washington, D. C.
THE ROLE OF THE FEDERAL GOVERNMENT IN TECHNOLOGICAL FORECASTING,
by Donald Schon. Jan 66, 262p
Report to the President's Committee on Manpower and the National Commission of Technology,

Automation and Economic Progress. See also PB-170 599-1.

Descriptors: (*United States Government, Economics), (*Manpower studies, Automation), (*Automation, Economics), (*Economics, Automation), Employment, Labor, Training, Technical information centers, Education, Commerce, Personnel management, Management planning, Probability, Scientific research, Distribution (Economics), Industries.

Identifiers: Forecasting.

In February 1965, an interagency task group was formed. Its purpose was to investigate the current role and the possible future role of technological forecasting in the Federal Government, with particular emphasis on the relevance of technological forecasting to manpower problems, policies and programs. Specifically, the investigation was to focus on: (1) Action points in Government at which technological forecasting might be useful and used, if available. (2) Criteria for information at those action points. (3) Current technological forecasting activities and methodologies and their adequacy to Federal requirements. From its findings, the task group recommended the establishment of municipal and regional forecasting centers, coupled to local manpower adjustment organizations and activities. It also recommended assignment to a Federal Agency of responsibility for providing national data, trend and policy inputs to these local centers; for co-ordinating their activities, and for developing and evaluating forecast methodology for broad use in the Federal Government. (Author)

AD-633 491 See Field 5K

AD-633 596 See Field 6E

AD-633 936 See Field 13J

AD-633 997 See Field 22B

5D. HISTORY, LAW, AND POLITICAL SCIENCE

AD-633 700 Field 5D
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
SOVIET PARTY-MILITARY RELATIONS: CONTAINED CONFLICT,
by Roman Kolkowicz. May 66, 49p P-3371
Prepared for presentation at the Far Western Slavic Conference at the Univ. of California, Berkeley, May 1, 1966.

Descriptors: (*Communism, USSR), (*Political science, Warfare), (*Warfare, USSR), Communists, Military personnel, Officer personnel.

The military's growing self-assertiveness and trend toward institutional autonomy remains a serious concern to the Party leaders and they continue to seek ways of solving its dilemma. Most desirable from their point of view would be, of course, an officer corps that consisted only of dedicated and unquestionably loyal men, each of whom combined the best traits of the commander with those of the commissar. Whenever an attempt has been made, however, to realize this ideal--most recently after Marshal Zhukov's ouster--the results have been disappointing; for it has proved difficult, if not impossible, for the officer to maintain with equal fervor the dual loyalty to his profession and to the Party, notwithstanding the theoretical principle that ideological motivation will govern both loyalties and preclude any possible conflict.

AD-633 491 See Field 5K

AD-633 546 See Field 5C

AD-633 919 See Field 5C

AD-634 014 See Field 5G

AD-634 015 See Field 5G

5E. HUMAN FACTORS ENGINEERING

N66-21824 Field 5E
CFSTI Prices: HC$7.45 MF$2.25
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
HUMAN ENGINEERING DESIGN CRITERIA STUDY.
Final rept.,
by W. R. Harmer, L. R. Uyeda, T. J. Wong, S. Truax, andD. L. Van Kekerix. 31 Jan 66, 446p
MSFC-STD-267A
Contract NAS8-11256
NASA CR-71532

Descriptors: *Launch vehicle, *Human engineering, *Spacecraft design.

N66-22269 Field 5E
CFSTI Prices: HC$7.00 MF$1.75
General Electric Co., Philadelphia, Pa. Missile and Space Div.
NASA/LANGLEY 55 FOOT VACUUM CYLINDER MAN RATING.
Final design rept.
1965, 316p
Contract NAS1-5311
NASA CR-66076

Descriptors: *Environmental control, *Systems design, *Instrumentation, *Vacuum chamber.

AD-414 428 See Field 5H

PB-170 365 See Field 13B

PB-170 368 See Field 13B

5G. LINGUISTICS

AD-633 682 Field 5G
CFSTI Prices: HC$7.00 MF$1.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE FUNDAMENTALS OF HUMAN AND MACHINE TRANSLATION,
by I. I. Revzin, and V. Yu. Rozentsveig. 17 Mar 66, 305p FTD-TT-65-1597
TT 66-61408
Unedited rough draft trans. of mono. Osnovy Obshchego i Mashinnogo Perevoda, Moscow, 1964 243p.

Descriptors: (*Machine translation, *Linguistics), (*Languages, Machine translation), Semantics, Information theory, Syntax, USSR.

This text seeks to familiarize potential specialists in the field of machine translation and related disciplines with the fundamentals of the theory of translation. The text makes an attempt to discuss the problems of traditional translation theory in the terms of structural linguistics.

AD-633 683 Field 5G
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
SCIENTIFIC TECHNICAL INFORMATION (SELECTED ARTICLES).
17 Mar 66, 47p FTD-TT-65-1304
TT 66-61410
Unedited rough draft trans. of Nauchno-Tekhnicheskaya Informatsiya (USSR) n2 p20-7, 47-8 1964.

Descriptors: (*Machine translation, *Russian language), Mathematical logic, Language, USSR, Dictionaries.

Contents: Certain problems of translation from information-logical language into Russian, by Ye. V. Paducheva; and Device for the selection of information by the given word, by D. G. Antidze.

AD-634 014 Field 5G, 9B, 5D
CFSTI Prices: HC$6.00 MF$1.25
Stanford Univ., Calif. Studies in International Conflict and Integration.
A SYSTEM OF AUTOMATED CONTENT ANALYSIS OF DOCUMENTS.
Final rept. 3 Dec 62-2 Apr 63,
by Ole R. Holsti. 31 Mar 63, 221p
Contract N60530-8263

Descriptors: (*Computational linguistics, *Reports), (*Foreign policy, Reports), (*Political science, Analysis), Subject indexing, Cuba, Computers, Coding, Information retrieval.

Identifiers: General inquirer, Key-punching, Words.

CONTENTS: Dictionary construction. Data preparation: Coding text into themes. Data preparation: Word subscripting. Data preparation: Theme coding. Data preparation: Keypunching. Data retrieval and analysis. The Stanford political dictionary. President Kennedy's October 22, 1962 address regarding the Cuban crisis.

AD-634 015 Field 5G, 9B, 5D
CFSTI Prices: HC$5.00 MF$1.00
Stanford Univ., Calif. Studies in International Conflict and Integration.
THE MEASUREMENT OF INTERNATIONAL TENSIONS: A REVIEW OF METHODOLOGICAL PROBLEMS.
Final rept.,
by Robert C. North, and Jan F. Triska. 31 Aug 62, 162p
Contract N60530-7702

Descriptors: (*Computational linguistics, *Reports), (*Foreign policy, Reports), (*Political science, Analysis), Subject indexing, Warfare, Statistical analysis, Factor analysis, Computers.

Identifiers: General inquirer.

An attempt was made (1) to review techniques that had been adapted or devised for preparation and analysis of data used in study of Sino-Soviet controversies of 1960-1961 and (2) to explore mechanical methods for replacing the most time-consuming aspects of manual content analysis. CONTENTS: Measurement of qualitative variables in world politics: the Q-sort method of scaling. The Q-sort and another scaling technique. 'Evaluative assertion analysis' as a technique in research in international conflict. Modes of analysis: functional distance, patterns of variables, and factor analysis. Factor analysis: an exploratory application to Sino-Soviet perceptions. Applications of computer content analysis to research on international conflict. Application of the 'General Inquirer' to content analysis of diplomatic documents. System for content analysis by computer for selected categories of action.

PB-169 598 Field 5G
CFSTI Prices: HC$1.10 MF$0.50
Washington Univ., Seattle.
DISCUSSION, SUPPLEMENTATION AND CORRECTION OF DR. PAUL GARVIN'S REPORT.
University of Washington MT Project,
by Erwin Reifler. 1957, 7p
Prepare for presentation at Session on Machine Translation of International Congress of Linguists (8th) Oslo, 7 Aug 57.

Descriptors: (*Machine translation, Linguistics), (*Linguistics, Machine tanslation), Analysis, Language.

The purpose of the report is to determine how many of the bilingual linguistic problems can be solved by lexicography alone--that is, without any logical machine procedures for linguistic purposes whatsoever; and to analyze the translation process itself. (Author)

5H. MAN-MACHINE RELATIONS

AD-414 428 **Field 5H, 9B, 5E**
CFSTI Price: HC$6.60
Applied Psychological Services, Wayne, Pa.
TECHNIQUES FOR EVALUATING OPERATOR LOADING IN MAN-MACHINE SYSTEMS. MODIFICATION AND FURTHER EVALUATION OF A DIGITAL MAN-MACHINE SIMULATION MODEL,
by Arthur I. Siegel, and J. Jay Wolf. Jul 63, 69p
Contract Nonr-2492 (00)

Descriptors: (*Man-machine systems, Simulations), (*Human engineering, Digital computers), (*Digital computers, Man-machine systems), Mathematical models, Design, Refueling in flight, Data, Analysis, Interception, Launching, Stress (Psychology), Reaction (Psychology), Reflexes, Numerical analysis, Stochastic processes, Statistical tests, Tests, Programming (Computers).

A digital computer simulation model was previously derived and employed for simulating the performance of the operator (s) in a man-machine system. The technique is based on an analysis of the performance of each operator, arranged into ordered, discrete actions called 'subtasks,' and the compilation for each of certain source data. These data, together with selected parameter values (e.g., the time allotted for task performance), are placed in punched card form and introduced into a digital computer which sequentially simulates, according to the rules of the model, the 'performance' of each subtask by each operator. The normal sequence of subtasks may be modified if actions have to be skipped or repeated due to failure of a subtask by either operator or as a result of operator decisions. A simulation is completed when the operators either use all allotted time or successfully complete the task. Results are recorded indicating the areas of operator overload, failure, idle time, peak stress, etc., for the given set of selected parameters. Repetitions of the simulation, with different parameter values, yield a range of records. (Author)

AD-634 106 **Field 5H, 12B**
CFSTI Prices: HC$7.60 MF$0.75
Columbia Univ., New York. Electronics Research Labs.
EVALUATION OF MATHEMATICALLY EQUIVALENT TRACKING SYSTEMS.
Final rept.,
by J. M. Notterman, and D. E. Page. 31 Jul 60, 73p CU-5-60-Nonr-226 (42)-ERL, F1135
Contract Nonr-266 (42)

Descriptors: (*Tracking, Performance (Human)), (*Mathematical models, Tracking), Man-machine systems.

The research reported is concerned principally with the effect upon tracking performance of variation in the mechanical characteristics of a manual control device, with the overall transfer function of the control system held constant. The data indicate that despite 'mathematical equivalence,' or constancy of overall transfer function, computer-generated dynamics do not successfully replace control device dynamics, in terms of the effect upon operator performance. The discrepancy is attributed to the importance of cutaneous, kinesthetic, and proprioceptive feedback. Ancillary research concerning practice effects, aiding ratio, cross-correlational analysis, and scaling of forces is also described. (Author)

N66-21240 **Field 5H**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.
ANALYSIS OF PREDICTOR MODEL,
by J. Kreifeldt. 6 Jul 64, 41p M-9991-2
Grant NsG-107
NASA CR-62006

Descriptors: *Predictor, *Feedback control system, *Human performance, *Operator performance.

N66-22195 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
METHODS OF CONFUSION IN A PATTERN MATCHING TASK,
by J. A. Duke. 1965, 14p NASA-TM-X-56674
Prepared for presentation at the Annual Meeting of Western Psychological Association (45th), Honolulu, Hawaii, 14-19 Jun 1965.

Descriptors: *Human reaction, *Pattern recognition, *Psychophysiology, *Degradation.

N66-22198 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
MANUAL CONTROL FOR THE MORL,
by R. W. Will. 1964, 21p NASA-TM-X-56445
Prepared for presentation at the SAE-18 Comm. Meeting, New York, 8-10 Jul 1964.

Descriptors: *Control system, *Manned orbital research laboratory (Morl).

N66-22220 **Field 5H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
HUMAN TRANSFER FUNCTIONS FOR MULTI-AXIS AND MULTI-LOOP PROBLEMS,
by J. J. Adams. 1965, 12p NASA-TM-X-56684
Prepared for presentation at the AIAA Manned Space Flight Meeting (4th), St. Louis, 11-13 Oct 1965.

Descriptors: *Flight control, *Transfer function, *Information, *Pilot performance.

N66-22272 **Field 5H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
HUMAN TRANSFER FUNCTIONS IN MULTI-AXIS AND MULTI-LOOP CONTROL SYSTEMS,
by J. J. Adams, G. J. Hurt, Jr., and H. P. Bergeron. Apr 66, 46p NASA-TN-D-3305

Descriptors: *Mathematical model, *Pilot performance, *Closed loop system, *Control system, *Manual control, *Transfer function.

AD-633 649 **See Field 17B**

PB-170 365 **See Field 13B**

5I. PERSONNEL SELECTION, TRAINING, AND EVALUATION

AD-633 474 **Field 5I, 5J**
CFSTI Prices: HC$3.00 MF$0.75
Human Resources Research Office, George Washington Univ., Alexandria, Va.
THE DERIVATION, ANALYSIS, AND CLASSIFICATION OF INSTRUCTIONAL OBJECTIVES.
Technical rept.,
by Harry L. Ammerman, and William H. Melching. May 66, 58p TR-66-4
Contract DA-44-188-ARO-2,
Proj. DA-2J024701A712-01

Descriptors: (*Education, Management planning), (*Job analysis, Education), Performance (Human), Students, Analysis, Psychometrics, Behavior.

An examination of the methods, terms, and criteria associated with the determination of student performance objectives was made in order to synthesize and apply the relatively new developments in Human Factors research on this subject. Educational and training research literature on the subject was examined to identify procedures currently being used or proposed. A survey of eight Army service schools was conducted to determine procedures employed by instructional personnel in determining course content. On the basis of data obtained, important problems arising in connection with the development of objectives are identified and analyzed. A system for analyzing instructional objectives by identifying factors that influence their meaningfulness and usefulness was developed. Types of student performance objectives are listed, and a classification scheme for terminal objectives is suggested. The classification is based on five factors on which a statement of an objective may vary, affecting the nature of the student action description and the communicability of the statement itself. The variety of terms associated with objectives are discussed. (Author)

AD-633 492 **Field 5I**
CFSTI Prices: HC$4.00 MF$1.00
Naval Personnel Research Activity, Washington, D. C.
BUREAU OF NAVAL PERSONNEL SYMPOSIUM, U. S. NAVY MANPOWER MANAGEMENT; PROSPECTUS FOR THE 1970's, 16-17 APRIL 1963.
17 Apr 63, 135p

Descriptors: (*Naval personnel, *Manpower studies), (*Management planning, Naval personnel), (*Personnel management, Symposia), Naval training, Military requirements, Human engineering, Classification.

Contents: Manpower requirements vs inventories; Classification structures (Officer-enlisted); Training and education; Human factors - engineering.

AD-633 597 **Field 5I**
CFSTI Prices: HC$1.00 MF$0.50
Naval Personnel Program Support Activity, Washington, D. C. Personnel Research Lab.
FOLLOW-UP COMPARISONS OF THREE-YEAR WITH FOUR-YEAR AND MINORITY ENLISTEES.
Final rept.,
by Aaron Katz, and Harold L. Sharp. May 66, 24p WRM-66-39
Proj. PF016040103

Descriptors: (*Naval personnel, *Naval training), Recruiting, Time, Personnel management, Correlation techniques.

Three-year enlistees were compared with four-year and minority enlistees, all three groups consisting of males who had enlisted in the Navy without prior military service between 1 January and 30 June 1962, and who were on active duty as of 30 June 1964. The men in the three samples were each eligible for assignment to at least one Class A school on the basis of prerequisite BTB scores, and the three samples were matched on general ability (GCT ;ARI ;MECH). Comparisons were made as of 30 June 1964--two to two and one-half years after initial enlistment--on: (1) Rates of initial assignments to six broad categories of Class A schools and no A school, (2) rates of initial assignments, among those assigned to Class A schools, to the aforementioned six categories of schools, (3) rate of enlistment extensions for Class A school assignment, (4) rate of reenlistment for assignment to the STAR Program, and (5) rate of advancement in pay grade. Certain of the findings indicate that three-year enlistees were trained somewhat differently than four-year and minority enlistees. (Author)

AD-633 598 **Field 5I**
CFSTI Prices: HC$1.60 MF$0.50
Bureau of Naval Personnel, Washington, D. C. Personnel Research Div.
STUDIES IN CAREER MOTIVATION: III. EFFECTS OF REPEATED QUESTIONNAIRE ADMINISTRATION ON RETURNS AND ON INTENDED AND ACTUAL REENLISTMENT,
by Albert S. Glickman, and George W. Mayeske.Feb 62, 15p RS-62-5
See also PB-142 135.

Descriptors: (*Naval personnel, *Attitudes), (*Recruiting, Psychometrics), (*Motivation, Naval personnel).

The report is one of a series dealing with the attitudes toward the Navy and the career intentions of Naval enlisted men during the course of their first enlistment. It was found that repeated administration of the Career Motivation questionnaire (CAMOSUR XI) did not have an adverse effect on the proportion of subjects returning the questionnaire nor on the intended and actual reenlistment of the participants. Some tendency was also found for those men who received a questionnaire to remain in the Navy more often than did those who did not get any questionnaire. The administration of the questionnaire seemed to have its most favorable effect on the actual reenlistment of those subjects responding six months before the end of their initial enlistment. (Author)

AD-633 923 **Field 5I, 9B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
VOCATIONAL INTERESTS AND SUCCESS OF COMPUTER PROGRAMMERS.
Professional paper,
by Dallis K. Perry. 19 May 66, 14p SP-2415

Descriptors: (*Computer personnel, Psychometrics), (*Wages, Computer personnel), Programming (Computers), Job analysis, Education, Personnel management.

Strong Vocational Interest Blank (SVIB) scores of computer programmers were analyzed to determine their relationships to job satisfaction and to success as represented by salary level relative to experience and education. Although a few statistically significant relationships were found, they were of very low magnitude and little practical significance. SVIB items that differentiated between higher and lower relative salary groups in one sample of programmers were combined into a special scoring key, but the key was not appreciably related to relative salary in a second sample of programmers. (Author)

AD-634 000 **Field 5I, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
PSYCHOLOGICAL FACTORS IN VOLUNTARY WITHDRAWAL FROM FLIGHT TRAINING.
Special rept.,
by Richard S. Pomarolli. Mar 66, 28p SR-66-2

Descriptors: (*Naval training, Flight), (*Aviation personnel, Psychometrics), Personnel management, Recruiting, Military psychology, Job analysis.

The study was undertaken ian attempt to better understand the psychological factors prompting the decision to voluntarily withdraw (DOR) from flight training. Findings are based on an intensive analysis of questionnaire forms administered to 86 DOR's from Basic Flight Training. Analysis indicates that the causative factors most commonly checked tend to cluster around the idea of 'losing interest in,' 'not deriving satisfaction from,' or just plain 'disliking' flying. Results also show that widely varying time periods elapse between the mental decision to withdraw and the formal expression of that decision. (Author)

N66-22366 **Field 5I**
CFSTI Price: MF$0.50
National Aeronautics and Space Administration, Washington, D. C.
NASA ASTRONAUTS.
1966, 31p NASA-EP-34
Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.20.

Descriptors: *Pilot, *Space program, *Astronaut training.

PB-169 043 **Field 5I**
CFSTI Prices: HC$4.00 MF$0.75
System Development Corp., Santa Monica, Calif.
TRAVELING SEMINAR AND CONFERENCE FOR THE IMPLEMENTATION OF EDUCATIONAL INNOVATIONS.
Final rept.,
by Malcolm Richland. 25 Oct 65, 118p Technical memo. TM-2691
Contract OE-4-16-007

Descriptors: (*Education, Effectiveness), (*Teaching methods, Effectiveness), Instructors, Students, United States.

The report describes an approach designed to reduce the lag time between the development of new classroom practices and diffusion of proven ideas throughout the Nation's school districts. Under the provisions of the National Defense Education Act, Title VII, Part B, System Development Corporation was awarded a contract by the U. S. Office of Education to conduct a study of the effectiveness of 'traveling seminars,' or field site visits, by educators to schools that were known to be operating successful innovation programs. The purpose of the project was to see whether this technique was an effective dissemination method for shortening the gap between innovation and practice in education. This report presents a summary of the project and includes the conclusions and recommendations of the SDC study. The principal objectives of the SDC project were to: (1) Conduct a survey of, and visitations to, school sites with outstanding innovations; (2) Implement and copduct a traveling seminar of some 120 educators to select innovating school districts in four regions of the United States; (3) Conduct a conference on the problems of implementing tested innovations; and (4) Perform research related to the testing of the field extension concept in education. (Author)

AD-633 556 **See Field 9B**

AD-633 910 **See Field 5A**

PB-170 043 **See Field 5C**

PB-170 111 **See Field 5C**

PB-170 599-1 **See Field 5C**

PB-170 599-2 **See Field 5C**

5J. PSYCHOLOGY (INDIVIDUAL AND GROUP BEHAVIOR)

AD-466 017 **Field 5J**
CFSTI Prices: HC$1.60 MF$0.50
Chemical Research and Development Labs., Edgewood Arsenal, Md.
STANDARIZATION STUDIES WITH THE REPETITIVE PSYCHOMETRIC MEASURES. I. DETERMINING EQUIVALENCE OF FORMS.
Rept. for Sep 64-Mar 65,
by James J. Hart. Jul 65, 11p CRDL-TM-2-17
Proj. DA-1C522301A079

Descriptors: (*Psychometrics, Standardization), Performance tests, Selection, Test construction (Psychology).

The purpose of the study was to verify the finding of the authors of the Repetitive Psychometric Measures that the twenty forms of the Number Facility (NF) and Speed of Closure (SC) sub-tests were not of equivalent difficulty. Twenty subjects were given twenty forms of the NF and SC and twenty additional trials on reconstructed forms of the NF. The relative level of difficulty for forms from our samples correlated significantly with the sample of the authors of the test for the SC, but not for the NF. The reconstructed forms of the NF were not more equivalent than the original forms. Practical implications of these findings for the use of these sub-tests were discussed. (Author)

AD-633 562 **Field 5J, 6D**
CFSTI Prices: HC$2.00 MF$0.50
Western Management Science Inst., Univ. of California, Los Angeles.
A MODEL OF INFORMATION ACQUISITION AND ORGANIZATION.
Working paper,
by Earl B. Hunt. Mar 66, 30p WMSI Working Paper-97
Contract Nonr-233 (75),
Proj. NR-047-041

Descriptors: (*Learning, Neurology), (*Bionics, Memory), Drugs, Nerves, Central nervous system, Perception (Psychology).

Neurophysiological studies have shown the existence of a variety of 'feature detectors' in sensory branches of the nervous system. Psychopharmacological studies have shown that a variety of stimulants can be used to enhance learning in a way that is best explained by assuming that they act directly upon storage of the memory trace. A model of discrimination is proposed which incorporates the existence of feature detectors and uses them, plus associated postulates, to derive a facilitory effect of stimulant drugs upon memory. The model's implications for more complicated memory situations, such as the problems studied in human verbal learning, are also considered. (Author)

AD-633 566 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
STRESS.
Research paper,
by Joseph Weitz. Apr 66, 43p RP-P-251
Contract SD-50,
Task T-8

Descriptors: (*Stress (Psychology), Reaction (Psychology)), Confinement (Psychology), Sensory deprivation, Perception (Psychology), Group dynamics, Military psychology.

A brief section describes some areas of possible military interest in studies of stress--selection, classification, training, human factors and systems research and, of course, stress as related to the combat situation, among others. Since there is difficulty in accurately defining stress, it was considered most useful to describe stimulus situations which may lead to what is called stress and responses which may occur as a result of the 'stress' situation. The stimuli considered are speeded information processing, overloading, environmental factors, perceived threat, physiological stimulation, isolation, confinement, blocking and frustration, and finally group pressures. The responses discussed are performance decrement, immobilization, inappropriate responses, physiological changes, verbal report, and performance enhancement. considering the stimulus situations which lead to stress and the responses which may be evoked as a result of certain stimulus situations, an attempt is made to suggest research areas which may prove useful in better understanding the stress mechanism and its effect.

AD-633 647 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Group Effectiveness Research Lab.

INITIATION OF STRUCTURE, CONSIDERATION, AND TASK PERFORMANCE IN INTERCULTURAL DISCUSSION GROUPS.
Technical rept.,
by Lynn R. Anderson. Apr 66, 29p TR-30
Contract Nonr-1834 (36), ARPA Order-454,
Proj. NR-177-472

Descriptors: (*Culture, Group dynamics), (*Leadership, *Attitudes), Effectiveness, Performance (Human), Perception (Psychology).

Ratings of the leader's Initiation of Structure and Consideration were obtained from members of 36 intercultural discussion groups consisting of one American and one Indian graduate student plus an American leader. Ratings of Group Atmosphere, Esteem for Leader, and Effectiveness of Leader were also obtained after each group had completed an intercultural negotiation task and also after completing a group creativity task. Results showed that on both tasks the American and Indian members' Esteem for Leader and Group Atmosphere ratings were positively correlated with the leader's considerate behavior but were not related to the leader's structuring behavior. The leader's Effectiveness as rated by Americans was positively correlated with both Consideration and Initiation of Structure scores. When rated by the Indian subjects, the leader's Effectiveness was correlated only with his Consideration score. The leader's self ratings of Consideration and Initiation of Structure both were positively correlated with his own rating of the Group Atmosphere and with his rating of his own Effectiveness. The group performance scores were unrelated to Consideration ratings. However, group performance was positively related to the Initiation of Structure ratings, but this finding was specific to the culture and the task. The results were discussed in terms of differences in 'role expectations' between the two cultural groups. (Author)

AD-633 648 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Group Effectiveness Research Lab.
SOME EFFECTS OF CULTURAL TRAINING ON LEADERSHIP IN HETEROCULTURAL TASK GROUPS.
Technical rept.,
by Martin M. Chemers, Fred E. Fiedler, Duangduen Lekhyananda, and L. M. Stolurow. Apr 66, 37p TR-31
Contract Nonr-1834 (36), ARPA order-454,
Proj. NR-177-472

Descriptors: (*Culture, Training), (*Leadership, Training), (*Training, Culture), Group dynamics, Effectiveness, Attitudes.

An exploratory study, investigating the use of cultural training programs to increase leader effectiveness in heterocultural problem solving groups was conducted. The 24 American Ss were divided into two equal groups on the basis of their leader attitudes as assessed by the Least Preferred Co-worker (LPC) score. These groups were then further dichotomized for purposes of training, with 12 men receiving three hours of programmed instruction in Arab culture, while the other 12 received a culturally irrelevant program on Mid-East geography, which was similar in length and form to the culture program. A generally higher level of performance was obtained for culturally trained leaders on measures of both productivity and leader-member relations. Differences were also found between permissive, human relations-oriented leaders as opposed to directive, controlling leaders. Interaction effects between cultural training and leadership style show that leaders with differing leadership styles benefit from training in specifiable ways. Positive attitude changes occurred as a result of cultural training and face-to-face heterocultural interaction. (Author)

AD-633 840 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Educational Testing Service, Princeton, N. J.
COEFFICIENT ALPHA AND THE RELIABILITY OF COMPOSITE MEASUREMENTS.
Technical rept.,
by Melvin R. Novick, and Charles Lewis. Apr 66, 28p RB-66-18; TR-1
Contract Nonr-4866 (00),
Proj. NR-042-249

Descriptors: (*Psychometrics, Reliability), Intelligence tests, Theory.

Following a general approach due to Guttman, coefficient alpha is derived as lower bound on the reliability of a test. The necessary and sufficient condition under which equality is attained in this inequality and hence that alpha is equal to the reliability of the test is derived and shown to be closely related to the recent redefinition of the concept of parallel measurements due to Novick. This condition is then also shown to be closely related to the unit rank assumption originally adopted by Kuder and Richardson in the derivation of their formula 20. The assumption later adopted by Jackson and Ferguson and the one adopted by Gulliksen are shown to be related to the necessary and sufficient condition derived here. It is then pointed out that the statement that 'coefficient alpha is equal to the mean of the split-half reliabilities' is true only under the condition assumed by Cronbach in the body of his derivation of this result. Finally some limitations on the uses of any function of alpha as a measure of internal consistency are noted. (Author)

AD-634 037 **Field 5J, 6J, 6S**
CFSTI Prices: HC$3.00 MF$0.75
Human Resources Research Office, George Washington Univ., Alexandria, Va.
SUMMARY OF LITERATURE REVIEW ON EXTENDED OPERATIONS.
Consulting rept.,
by Dennis Cannon, Eugene Drucker, and Theodore Kessler. Dec 64, 58p
Contract DA-44-188-ARO-2

Descriptors: (*Performance (Human), Endurance), (*Stress (Psychology), Performance (Human)), Time, Reviews, Stress (Physiology), Temperature, Nutrition, Clothing, Drugs, Vibration, Confined environments, Noise, Military psychology.

The report comprises a summary of a review of psychological literature pertaining to performance for extended periods of time. The material is organized into the following topics, as they relate to performance: sleep loss, temperature, nutrition, prolonged performance, drugs, stress, vibration, confinement, rest and personnel replacements, noise, radiation, and clothing. In addition, a brief summary of vigilance literature is included. The inconclusive nature of the reviewed research precludes supporting or denying the thesis that troops can be expected to remain effective for 48 hours or longer. Endurance limits may vary significantly from one task to another. For this reason, suggestions for research are included. (Author)

N66-21821 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Los Angeles. Dept. of Anatomy.
REGIONAL CEREBRAL IMPEDANCE CHANGES IN ALERTING, ORIENTING AND DISCRIMINATIVE RESPONSES - THE ROLE OF NEURONAL ELEMENTS IN THESE PHENOMENA,
by W. R. Adey, J. T. McIlwain, R. T. Kado, and D. O. Walter. 1966, 35p
Contract AF 49 (638)-1387, Grant NsG-505
NASA CR-71549
Supported in part by Grant PHS-MH-03708.

Descriptors: *Animal study, *Cat, *Electric measurement, *Impedance measurement, *Neuron transmission.

N66-22372 **Field 5J**
CFSTI Prices: HC$2.00 MF$0.50
Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
A TIME CONSTANT INVOLVED IN ATTENTION AND NEUTRAL INFORMATION PROCESSING,
by A. B. Kristofferson. Apr 66, 45p
Contract NAS2-2486
NASA CR-427

Descriptors: *Attention, *Human behavior, *Neurology, *Psychophysiology.

AD-633 474 **See Field 5I**

AD-633 911 **See Field 9B**

AD-633 982 **See Field 6A**

AD-634 000 **See Field 5I**

PB-169 166 **See Field 6S**

PB-169 167 **See Field 6S**

5K. SOCIOLOGY

AD-633 491 **Field 5K, 5D, 15D, 5C K**
CFSTI Price: MF$2.00
American Univ., Washington, D. C. Foreign Areas Studies Div.
AREA HANDBOOK FOR MOROCCO.
Nov 65, 456p
DA PAM-550-49

Descriptors: (*Morocco, Handbooks), Sociology, History, Geography, Language, Culture, Education, Religion, Public health, Political science, Government (Foreign), Economics, Armed forces (Foreign).

The volume is one of a series of handbooks prepared by the Foreign Areas Studies Division (FASD) of The American University, designed to be useful to military and other personnel who need a convenient compilation of basic facts about the social, economic, political and military institutions and practices of various countries. The emphasis is on objective description of the nation's present society and the kinds of possible or probable change that might be expected in the future. The handbook seeks to present as full and as balanced an integrated exposition as limitations on space and research time permit. It was compiled from information available in openly published material. Extensive bibliographies are provided to permit recourse to other published sources for more detailed information. There has been no attempt to express any specific point of view or to make policy recommendations.

AD-633 906 **Field 5K**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
TECHNOLOGY AND MAN'S FUTURE.
Professional paper,
by Hasan Ozbekhan. 27 May 66, 45p SP-2494

Descriptors: (*Industrial research, State-of-the-art reviews), (*Social sciences, Industrial research), Economics, Theory.

A great part of contemporary humanity shares a world view dominated by 'technological' values. The report examines the dangers and the promises which inhere to this world view and to determine where the human being stands in relation to the technological milieu he has created.

6A. BIOCHEMISTRY

AD-633 469 **Field 6A, 6E, 6R**
CFSTI Prices: HC$2.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
STUDIES ON TRANSFER OF MYELOMA PROTEIN SYNTHESIS WITH RNA FROM C3H PLASMA CELL TUMOR (X5563). I. IN VIVO INCUBATION OF RNA-TREATED CELLS.
Technical rept.,

by Paul H. Chin, and Myron S. Silverman. 6 Jun 66, 26p USNRDL-TR-1005
NAVMED MR005.08-1200-4

Descriptors: (*Proteins, Synthesis), (*Immunity, Radiation effects), (*Ribonucleic acids, Biosynthesis), Antigens + antibodies, Lymphocytes, Cells (Biology), In vitro analysis, Neoplasms, Radiological dosage, Electrophoresis, Radiation injuries, Mice.

Lymphoid cells from normal C3H mice were incubated in vitro with RNA isolated from the X5563 plasma cell tumor. The cells were subsequently injected into sublethally irradiated isogenic mice. Electrophoretic analysis of sera from these recipient mice showed the presence of a serum component having the same electrophoretic mobility as the gamma myeloma protein synthesized by the tumor cells. The induced synthesis of this protein was relatively stable and persisted for approximately forty days. However, the protein was detected in sera from only a small percentage of the animals. Sera from mice injected with cells incubated with RNA isolated from normal lymphoid tissues did not contain the protein nor was it demonstrated in sera from normal or irradiated mice. (Author)

AD-633 812 **Field 6A**
Indiana Univ., Bloomington. Dept of Chemistry.
I. STRUCTURE AND FORMATION OF ANTIBODIES. II. ROLE OF THE ANTIGEN IN ANTIBODY FORMATION,
by F. Haurowitz. 1964, 16p
Contract Nonr-3104 (00), Grant NSF-GB-2519

Descriptors: (*Antigens + antibodies, Biosynthesis), Gamma globulin, Serum albumin, Blood proteins, Purification, Antigen-antibody reactions, Molecular structure, Immune serums, Genetics, Chemical analysis, Amino acids, Enzymes, Labeled substances, Radioactive isotopes, Peptides, Desoxyribonucleic acids, Ribonucleic acids, Immunology.

AD-633 970 **Field 6A**
CFSTI Prices: HC$3.00 MF$0.75
Virginia Univ., Charlottesville. Biochemical Lab.
RED BLOOD CELL PRESERVATION.
Progress rept. for 1 Jul 65-30 Jun 66,
by Alfred Chanutin. 30 Jun 66, 64p
Grant DA-MD-49-193-65-G162

Descriptors: (*Erythrocytes, Preservation), Blood, Adenosine phosphates, Oxygen, Hemoglobin, Phosphates, Additives, Storage, Temperature, Chromatographic analysis, pH.

A number of erythrocyte phosphate metabolites (adenosine tri- and diphosphates, guanosine triphosphate, 2,3-diphosphoglycerate) affected heme-heme interaction and oxygen affinity with hemoglobin which resulted in a shift of the oxyhemoglobin dissociation curve to the right. In addition, tripolyphosphate, and tetra- and hexametaphosphates, particularly the latter, affected the dissociation curve in the same manner. Adenosine monophosphate and ribose-5-phosphate had no effect. These results, which are preliminary, were obtained with hemolysates and purified hemoglobin. Bloods, collected in ACD (pH 5.0) and CPD (pH 5.75) with and without additives, were stored in the cold (4C) for six weeks. After 0,2,4 and 6 weeks storage, the erythrocytes were assayed for DPG, ATP, ADP, AMP, IMP, TPN and GTP by ion exchange chromatography. The ATP of red cells in stored unsupplemented blood was maintained at higher concentrations than those stored in CPD blood; DPG levels were greater in CPD blood. These differences were due to the pH of the blood. The remaining compounds were not appreciably changed during storage. In ACD blood supplemented with small amounts of adenine (0.05 to 0.10 mmole/100 ml), the ATP concentrations were higher than in those which contained greater amounts of adenine (0.5 mmole). The DPG values decreased rapidly in these bloods. (Author)

AD-633 972 **Field 6A**
CFSTI Prices: HC$3.00 MF$0.75
Virginia Univ., Charlottesville. Biochemical Lab.
ERYTHROCYTE BIOCHEMISTRY,
by Alfred Chanutin. 30 Jun 66, 72p
Grant DA-MD-49-193-65-G162 16
Continuation of Grant DA-MD-49-193-64-G133.

Descriptors: (*Erythrocytes, Biochemistry), Enzymes, Diet, Adenosine phosphates, Deficiency diseases, In vivo analysis, Glutathione, Lipids, Nucleotides, Metabolism, Transport properties, Electrolytes (Physiology), Glucose, Amino acids, Desoxyribonucleic acids, Vitamin B complex, Proteins, Porphyrins, Anemias, Hormones, Oxygen, Pressure, Metals, Respiration, Osmosis, Electrophoresis, Membranes (Biology).

Contents: Erythrocyte enzymes; In vivo aging; Gluthathione; Lipids; Nucleotide metabolism; Transport; Erythrocyte preservation; Glucose metabolism; Components; Anemias; Effect of hormones; Effect of hyperbaric oxygenation; Osmotic fragility; Effect of heavy metals; Electrophoresis of erythrocytes; Membrane structure.

AD-633 982 **Field 6A, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Goteborg Univ. (Sweden). Inst. of Neurobiology.
BIOCHEMISTRY OF CNS CELLS DURING LEARNING.
Final scientific rept. 1 Apr 65-31 Mar 66,
by H. Hyden. 25 Apr 66, 46p
Grants AF-EOAR-53-65, AF-EOAR-28-63
AFOSR 66-0932
See also AD-617 980, AD-620 340, AD-628 365, AD-628 366, AD-628 899.

Descriptors: (*Learning, *Biochemistry), (*Nerve cells, Biochemistry), Ribonucleic acids, Proteins, Adenine, Nucleotides, Central nervous system, Desoxyribonucleic acids, Brain, Transfer of training, Sweden.

Synthesis of rapidly labelled RNA in brain cells was studied by sucrose density gradients. After a 15 minute pulse of 3H-orotic acid in the nuclear fraction and after 30 minutes in the cytoplasmic fraction, heterogeneous RNA was found in the range of 8 - 12 S. After further 15 to 30 minutes the profile of the synthesized RNA was changed due to a shift of the RNA peaks to 16 - 30 S. The synthesis of RNA was twice as rapid in the glia as in the nerve cells. The RNA synthesized in a learning situation in neurons and glia involved in the activity leading to the behavioural change was characterized in one case by a DNA-like composition and in another case by asymmetry, high adenine values and low (G + C)/(A + U) values compared to those of ribosomal RNA. To judge by these parameters, the lost RNA synthesized in cortical and brain stem neurons and glia in learning is of a chromosomal type. A case of biochemical error involving the RNA of the glia (Parkinson's disease) is discussed. The characteristics of the lost RNA produced in the glia at an early stage of the disease are taken to reflect a release of undesirable genomic activities at a crucial period of the life cycle.

AD-634 018 **Field 6A**
CFSTI Prices: HC$2.00 MF$0.50
Boston Univ., Mass. School of Medicine.
THE EFFECT OF DIPYRIDAMOLE ON THE ADENOSINE TRIPHOSPHATE LEVEL OF STORED HUMAN BLOOD.
Progress rept. 15 Feb-30 Sep 65,
by John G. Gibson, and Fabian Lionetti. 30 Sep 65, 29p
Contract Nonr-492 (08),
Proj. NR-105-440

Descriptors: (*Blood, Storage), (*Erythrocytes, Preservation), (*Enzyme inhibitors, Adenosine phosphates), (*Adenosine phosphates, Blood), Adenine, Amino acids, pH, Temperature.

The addition of dipyridamole, a synthetic deaminase inhibitor at a concentration of .0001 M to human Heparin-ACD blood fortified with adenosine, resulted in an increase in ATP above control levels during storage at 4 C, rising to a maximum of 130% at five days and falling to 20% at 30 days. Aliquots of the same blood fortified with adenine, adenosine or both incubated at 37 C for 30 hours showed levels at or slightly above the upper limit of + 2 SD or normal. The addition of dipyridamole at a concentration of .0001M to similar aliquots showed significant increases in ATP above normal, rising to a maximum of 300, 350 and 400% in the aliquots fortified with adenine, adenosine and both respectively. Whereas the presence of adenine, adenosine or both in Heparin-ACD blood did not significantly alter the rise in whole blood inorganic phosphate during incubation at 37 C for 30 hours, the addition of dipyridamole to similar aliquots depressed the level by from 20 to 30% of control values. Protection of the amino group of the adenine constituent of adenosine and AMP is a means to conserve erythrocyte ATP. (Author)

N66-21680 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., Baltimore. Psychiatric Inst.
MOLECULAR BINDING IN THE CELL SURFACE.
Progress rept. for 31 Dec 65,
by R. G. Grenell. 1965, 20p
Grant NgR-21-002-040
NASA CR-71544

Descriptors: *Electron paramagnetic resonance, *Microwave spectrum, *Molecular bonding, *Nuclear magnetic resonance.

N66-21681 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
BASE COMPOSITION OF INTACT NUCLEIC ACID OLIGOMERS,
by C. R. Cantor, and S. Mandeles. 1966, 24p
Grants NsG-479, PHS-GM-12158-02
NASA CR-71555
Submitted for publication.

Descriptors: *Absorption spectrum, *Chemical composition, *Nucleic acid, *Ribonucleic acid.

N66-22173 **Field 6A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
PRIMORDIAL ORGANIC CHEMISTRY AND THE ORIGIN OF LIFE,
by C. Ponnamperuma. 1964, 15p NASA-TM-X-54951
Prepared for presentation at the International Symposium on Bioastronautics and the Exploration of Space (3rd), San Antonio, 15-18 Nov 1964.

Descriptors: *Evolution, *Organic chemistry, *Synthesis.

N66-22183 **Field 6A**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
THE CHEMISTRY AND USE OF CELLULOSE DERIVATIVES FOR THE STUDY OF BIOLOGICAL SYSTEMS,
by H. H. Weetall, and N. Weliky. 1965, 57p
Contract NAS7-100
NASA CR-63141

Descriptors: *Cellulose, *Protein, *Biochemistry, *Polymer chemistry.

PB-170 551 **Field 6A**
CFSTI Prices: HC$2.60 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.

ETUDE DE QUELQUES PARAMETRES DE LA REACTION DE TRANSFORMATION DU FIBRINOGENE EN FIBRINE (Study of Some Parameters of the Fibrinogen - Fibrine Transformation Reaction),
by Daniel Hollard, Michel Suscillon, Genevieve Marcille, Francoise Rambaud, and Marie Baloyan. Apr 66, 28p CEA-R-2958
Text in French; summary in English.

Descriptors: (*Fibrinogen, Blood coagulation), (*Fibrin, Blood coagulation), Temperature, pH, Calcium, Ions, France.

The five parameters studied are: (1) The concentration of substratum: a certain quantity of enzyme determines an optimum quantity of enzyme determines an optimum quantity of fibrinogen. (2) The concentration of enzyme: a certain quantity of substratum defines an optimum quantity of substratum defines an optimum quantity of enzyme, beyond which the excess of enzyme is unable to act, the substratum being saturated by the enzyme. (3) The concentration of Ca ions: between 0,07 and 0,10 mg of Ca by mg of fibrinogen, the reaction appears with a great speed. Between 0,02 and 0,40 mg of Ca by mg of fibrinogen the fibrine stabilisation is possible, the F. S. F. can act only inside the definite bounds. (4) The pH of the solution: the reaction of the transformation appears with its maximum intensity on physiological pH, the polymerisation is not possible on acid pH. (5) The temperature has an effect which could not really be verified owing to the fact that the technical realisation is difficult. (Author)

AD-633 666 **See Field 6M**

6B. BIOENGINEERING

N66-21564 **Field 6B**
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Missiles and Space Co., Sunnyvale, Calif.
STUDY OF SPACECRAFT ON-BOARD TEST AND DATA PROCESSING TECHNIQUES.
Final summary rept.
Dec 65, 32p LMSC-4-05-65-5
Contract NAS2-2479
NASA CR-71611

Descriptors: *Bioinstrumentation, *Data processing, *Mission planning, *Telemetry.

N66-22279 **Field 6B**
CFSTI Prices: HC$3.00 MF$0.75
Melpar, Inc., Falls Church, Va.
RESEARCH AND DEVELOPMENT OF AN INSTRUMENT FOR DETECTION OF EXTRATERRESTRIAL LIFE BY OPTICAL ROTATORY DISPERSION.
Final technical rept.
Apr 66, 99p
Contract NASw-842
NASA CR-423

Descriptors: *Extraterrestrial life, *Polarimeter, *Rotation, *Life detector, *Optical measurement.

6C. BIOLOGY

AD-633 879 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
Medical Field Service School, Fort Sam Houston, Tex.
ECOLOGY AND CONTROL OF DISEASE VECTORS AND RESERVOIRS.
Progress rept. 1 Jul 65-30 Jun 66,
by Vernon J. Tipton, Martin L. Taylor, Eugene G. Thompson, and David G. Young. 30 Jun 66, 6p

Descriptors: (*Disease vectors, Ecology), Siphonaptera, Rodents, Culicidae, Diptera, Parasites, Control, Arboviruses, Distribution, Natural history, Texas, Mexico.

Over 5500 fleas were collected from 1500 rodents and nests at the base of Cerro Potosi, Nuevo Leon, Mexico. Most of these collections were made at elevations in excess of 10,000 feet. Of 28 species of fleas collected, five were new to science. Twenty-one species of mosquitoes were collected from the Welder Wildlife Reservation, Sinton, Texas. About 1000 specimens tested for the presence of the encephalitis virus, all were negative. Four species of sandflies were also collected. One subspecies collected represents an extension of the previous known distribution. (Author)

N66-22216 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
EARLY EFFECTS OF CORTICOSTERONE ON AMINO ACID INCORPORATION BY RAT LIVER SYSTEMS SUBSEQUENT TO ITS IN VIVO INJECTION,
by H. A. Leon. 1965, 18p NASA-TM-X-56676

Descriptors: *Biochemistry, *Corticosteroid, *Rat, *Animal study.

N66-22248 **Field 6C**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
QUANTITATIVE MEASUREMENT BY TELEMETRY OF OVULATION AND OVIPOSITION IN TAE FOWL,
by E. G. Averkin, C. M. Winget, and T. B. Fryer. 10 Nov 64, 27p NASA-TM-X-54841

Descriptors: *Chicken, *Radio telemetry, *Reproductive system, *Biological rhythm, *Body temperature (Biology).

N66-22253 **Field 6C**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
CONVENIENT LABELLING TECHNIQUE FOR MASS SPECTROMETRY - ACID CATALYZED DEUTERIUM AND OXYGEN-18 EXCHANGE VIA GAS-LIQUID CHROMATOGRAPHY,
by A. L. Burlingame, M. Senn, and W. J. Richter. 1965, 5p
Grants NsG-101-61, NsG-243-62
NASA CR-57489

Descriptors: *Radioactive isotope, *Chromatography, *Deuterium, *Mass spectrometry, *Oxygen 18.

AD-633 861 **See Field 12B**

AD-634 113 **See Field 6S**

6D. BIONICS

AD-633 642 **Field 6D, 9B**
CFSTI Prices: HC$7.75 MF$2.00
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INTRODUCTION TO CYBERNETICS,
by V. M. Glushkov. 17 Feb 66, 475p FTD-TT-65-942
TT 66-61394
Unedited rough draft trans. of mono. Vvedenie v Kibernetiku, Kiev, 1964 324p.

Descriptors: (*Cybernetics, Theory), Automata, Special functions (Mathematical), Mathematical logic, Digital computers, Programming (Computers), Algorithms, Automation, USSR.

This book contains the collected and unified material necessary for the presentation of such branches of modern cybernetics as the theory of electronic digital computers, theory of discrete automata, theory of discrete self-organizing systems, automation of thought processes, theory of image recognition, etc. Discussions are given of the fundamentals of the theory of boolean functions, algorithm theory, principles of the design of electronic digital computers and universal algorithmical languages, fundamentals of perceptron theory, some theoretical questions of the theory of self-organizing systems. Many fundamental results in mathematical logic and algorithm theory are presented in summary form, without detailed proofs, and in some cases without any proof. The book is intended for a broad audience of mathematicians and scientists of many specialties who wish to acquaint themselves with the problems of modern cybernetics. (Author)

AD-634 047 **Field 6D, 6F**
CFSTI Prices: HC$3.00 MF$0.75
Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
EXPERIMENTAL STUDIES OF HANDWRITING SIGNALS.
Technical rept. (Doctoral thesis),
by John S. MacDonald. 31 Mar 66, 70p TR-443
Contract DA-36-039-AMC-03200 (E), Grant NSF-GP-2495
Proj. 200-14501-B31F
Grants NIH-MH-04737-05, NsG-496.

Descriptors: (*Neuromuscular transmission, Electrophysiology), Electromagnetic waves, Bionics, Motion, Transducers, Geometric forms, Simulation.

Identifiers: Writing, Electromyography.

A system for measuring the displacement, velocity, and acceleration of hand-writing movements has been developed. Samples of handwriting processed by this system indicate that the acceleration waveforms of uninterrupted handwriting approximate multilevel trapezoidal time functions. Electronic simulation of the measured displacement, velocity, and acceleration waveforms of handwriting has been accomplished. The 'handwriting' produced by the electronic simulator can duplicate uninterrupted handwriting with a high degree of accuracy. The simulator represents a point mass driven by a trapezoidal 'force' function. Preliminary results have been obtained which are directed toward the establishment of relations between the model and the biological system responsible for handwriting. Possible applications of the techniques and apparatus developed in this report to problems of handwriting recognition and neurological studies are discussed. (Author)

PB-170 493 **Field 6D**
CFSTI Prices: HC$1.10 MF$0.50
Burroughs Corp., Paoli, Pa.
AN EXPERIMENTAL RESULT ON CHARACTER RECOGNITION,
by C. K. Chow. 29 Oct 62, 2p
Reprinted from IEEE Transactions on Electronic Computers, vEC12 n1 p25 Feb. 1963.

Descriptors: (*Character recognition, Test methods), (*Pattern recognition, Test methods), Matrix algebra, Set theory.

Identifiers: N-tuple.

Bledsoe and Bisson have reported (PB-166 454) some experimental results they have obtained on pattern recognition by six different schemes. The patterns used in their experiments were provided by W. H. Highleyman of Bell Telephone Laboratories, Murray Hill, N. J., and comprised 50 sets of hand-printed numerals, 0 through 9, in 12 x 12 binary matrix form, for a total of 500 patterns. The purpose of this communication is to present an additional experimental result for the same set of input data. The recognition method used is different from that of Bledsoe and Bisson; it is the method of nearest-neighbor dependence. (PB-164 286) The derivation of this method is based upon the assumption that the dependence of neighboring elements, among all possible interdependences among matrix elements, is dominant. A comparison seems to indicate that the nearest-neighbor method offers a somewhat better and more efficient approximation, at least for this particular set of input data. Other recognition results on

Highleyman's data, alphanumeric as well as numeric, are given in the nearest-neighbor discussion. (Author)

AD-633 562 See Field 5J

AD-633 924 See Field 6P

6E. CLINICAL MEDICINE

AD-447 276 **Field 6E**
CFSTI Price: HC$1.10
Army Medical Research Lab., Fort Knox, Ky. Dept. of Sensory Processes.
VENTRAL SURGICAL EXPOSURE OF BASI-OCCIPUT AND TYMPANIC BULLI OF THE CAT,
by James C. Boudreau, and Joel W. Rohwer. 29 May 64, 9p
Proj. DA-3A12001B801,
Task 01
AMRL 606

Descriptors: (*Brain, Surgery), (*Surgery, Brain), Surgical techniques, Auditory nerve, Surgical instruments, Medical research, Cats.

The object of this report is to describe, in easy to follow steps, the procedure used to expose the tympanic bulli and basi-occiput of the cat. This procedure is the one used in this laboratory to record from auditory centers in the brainstem. Drawings, together with a written step-by-step surgical procedure, are used to illustrate every part of the operation. With a minimum of practice an experienced investigator can expose the tympanic bulli and basi-occiput of the cat. Such exposure allows the investigator access to most areas of the hindbrain of the cat. (Author)

AD-633 596 **Field 6E, 5C, 12A**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PREVENTIVE MEDICINE POLICIES,
by J. J. McCall. May 66, 11p P-3368

Descriptors: (*Medicine, Statistical analysis), (*Dentistry, Mathematical models), Economics, Public health, Costs, Federal budgets, Medical examination, Scheduling, Probability, Partial differential equations, Cost effectiveness.

In recent years much research has been completed in both the design and implementation of policies for stochastically failing equipment. The purpose of this paper is to illustrate how this research on physical capital can be extended to human capital. The scheduling methodology that was developed for equipment can be used to evaluate preventive dental and medical policies for human beings. Since diagnosis and treatment of diseases require different modeling than the maintenance of physical equipment, many of the standard equipment models were modified so as to be applicable to human beings. Although several different criteria are investigated, the basic problem of evaluating human life is circumvented by treating only a trivial health problem, namely, the scheduling of dental examinations. This dental problem is trivial in the sense that longevity is not usually significantly affected by the scheduling policy. The extension of the simple dental policy to cancer detection is outlined, but longevity implications are not explored.

AD-633 738 **Field 6E**
CFSTI Price: MF$1.50
National Academy of Sciences-National Research Council, Washington, D. C. Committee on Trauma.
MECHANICAL DEVICES TO ASSIST THE FAILING HEART.
1966, 291p Pub-1283
Contracts DA-49-193-MD-2077, PH-43-64-44
Proceedings of a Conference sponsored by the Committee on Trauma, Div. of Medical Sciences, National Academy of Sciences-National Research Council, Washington, D. C., 9-10 Sep 64.

Descriptors: (*Heart, Pathology), (*Mechanical organs, Heart), Medical equipment, Prosthetics, Blood circulation, Cardiovascular system, Physiology, Cardiovascular diseases, Respiration, Oxygen, Hypoxia, Pumps, Implants, Blood volume, Pulse rate, Surgical techniques, Effectiveness, Symposia.

Contents: Physiology of assisted circulation; Physiology of prolonged oxygenation; Quantitation of effectiveness of cardiac assistance; Physiologic problems in prolonged pumping; Pulsatile versus nonpulsatile pumping; Some biological effects of pumping blood; Finger pumps; Roller pumps; Tube-compression pumps; Air-motor pulsatile-flow pump; Diaphragm pumps; Support of the right side of the heart; Further observations on veno-venous perfusion; Veno-Arterial assisted circulation without oxygenation; Veno-arterial pumping with oxygenation to support the failing heart; Arterio-arterial perfusion with oxygenation;Left-heart bypass; Left-heart bypass using an implantable blood pump; Physiology and rationale of counterpulsation; External counterpulsation as a means to reduce the work of the left ventricle; Augmentation and counterpulsation by external body compression; Counterpulsation; Synchronous external circulatory assistance.

AD-633 741 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
Columbia Univ., New York. Dept. of Anesthesiology.
SHOCK AND ALTERATION IN OXIDATIVE METABOLISM,
by Gabriel G. Nahas. 23 Mar 66, 2p
Contract DA-49-193-MD-2265

Descriptors: (*Shock (Pathology), *Oxygen consumption), Metabolism, Respiration, Meters, Glucose, Glycerols, Fatty acids, Lactic acid, Purine alkaloids, Hemorrhage, Levarterenol, Epinephrine, Lipids, Acidosis, Carbon dioxide, Measurement, Therapy, In vivo analysis, In vitro analysis, Dosage, pH.

Identifiers: Catecholamines, Hypercapnia.

AD-633 917 **Field 6E, 6M**
CFSTI Prices: HC$4.00 MF$0.75
Fordham Univ., Bronx, N. Y. Inst. of Contemporary Russian Studies.
SOVIET BIOMEDICAL JOURNALS: SELECTED ABSTRACTS, SER. III. NO. 4,
by Robert Pollitzer. Mar 66, 107p
Contract DA-18-064-AMC-495 (A)
TT 66-61435
Consists of direct translations and/or abstracts of Russian literature.

Descriptors: (*Medical research, USSR), Medicine, Periodicals, Abstracts, Immunology, Infectious diseases, Disease vectors, Parasites, Microbiology, Epidemiology.

AD-634 045 **Field 6E, 6L, 6S**
CFSTI Prices: HC$3.00 MF$0.75
Malecki Labs., Inc., Chicago, Ill.
RESEARCH ON THE BASIS OF COLD INJURY.
Final rept. 1 Jan-31 Dec 65,
by George J. Malecki, and Basil J. Luyet.31 Dec 65, 77p
Contract Nonr-4764 (00)
Subcontracted to American Foundation for Biological Research, Madison, Wisconsin.

Descriptors: (*Blood, Freezing), (*Erythrocytes, Preservations), Viability, Electrodialysis, Physiology, Hemolysis, Electrolytes (Physiology), Chlorides, Morphology (Biology), Osmosis, Blood plasma, Tissues (Biology), Cells (Biology), Medical equipment, Test methods.

The objective of the research study was to design, develop, and fabricate instruments for an to conduct studies on the effect of controlled deionization during slow freezing on viability of biological tissues. The studies included but were not limited to: (1) nature of freezing injury to living cells and, (2) employment of the instruments to study the effect of freezing on blood. Macro- and micro freeze-electrodialysis instruments were designed, fabricated, and placed into operating condition. With the macro unit, controlled deionization during slow freezing under isotonic conditions was achieved initially with a model saline system and subsequently, with blood. The micro unit was employed to observe directly under the microscope the morphology of the erythrocytes during deionization and freezing. Results obtained with the blood samples indicated that improved stability to freezing was not realized with the electrodialysis treatment. Apparently, the passage of electrical current through blood during freezing promotes hemolysis. What is believed to be a significant contribution to the area of blood preservation was achieved when it was found that definitely improved stability to freezing is obtained by separating plasma from whole blood, concentrating and partially deionizing it, and then remixing the concentrated plasma with the erythrocytes. (Author)

AD-634 053 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
PAROTID FLUID TOTAL PROTEIN IN PATIENTS WITH UREMIA AND PROTEINURIA.
Final rept., Jan-Sep 65,
by Richard H. Freeman, and Ira L. Shannon. Apr 66, 10p SAM-TR-66-41
Task 775303

Descriptors: (*Saliva, Proteins), (*Kidneys, Diseases), Blood diseases, Necrosis, Medical examination, Secretion, Dentistry.

Stimulated parotid fluid samples (238) were collected from 32 patients to determine if altered renal function was associated with deviations in salivary protein levels. Of the 32 patients studied, 10 were in the terminal stages of chronic renal disease, 7 were in the oliguric phase of acute tubular necrosis, and 15 had normal renal function. There were no significant differences in parotid fluid protein concentration or minute secretion associated with the state of renal function. (Author)

AD-634 055 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
PAROTID FLUID URIC ACID RESPONSES TO PROBENECID ADMINISTRATION AND TO HEMODIALYSIS ON THE ARTIFICIAL KIDNEY.
Final rept., Sep 64-May 65,
by Ira L. Shannon, and Richard M. Freeman. Apr 66, 11p SAM-TR-66-37
Task 775303

Descriptors: (*Saliva, Uric acid), Mechanical organs, Kidneys, Blood, Purification, Blood serum, Blood analysis, Diagnosis, Dentistry.

Identifiers: Probenecid.

Two experiments were conducted to ascertain the relationship between serum and parotid fluid uric acid levels. Samples of blood and parotid fluid were collected from six healthy young adult males, both before and during a five-day period of uricosuric dosage. In the second experiment parotid fluid and blood samples were collected from two subjects undergoing hemodialysis on the artificial kidney. The experimental procedures brought about sharp decreases in serum utic acid for all subjects. A highly significant correlation was found between serum and parotid fluid levels in all instances. These results strengthen the premise that parotid fluid uric acid measurements possess diagnostic potential. (Author)

AD-634 056 **Field 6E**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.

THE EFFECT OF MASTICATION AND DEGLUTITION ON TOOTH MOBILITY.
Rept. for Mar-Jun 65,
by Timothy J. O'Leary, Kenneth D. Rudd, Claude L. Nabers, and Arthur J. Stumpf Jr. Apr 66, 11p
SAM-TR-66-23
Task 775303

Desjriptors: (*Teeth, *Mastication), Ingestion (Physiology), Mobility, Sleep, Dentistry, Measurement.

The effect of chewing on tooth mobility values immediately after a period of sleep was studied in six subjects. On two separate days, the pre-experimental mobility values of six representative maxillary teeth, Nos. 9 to 14, were assessed between 0400 and 0500 hours. For 10 minutes subjects then chewed and swallowed test rolls of a uniformly firm consistency. Immediately thereafter, the mobility values were again assessed. The pre-post mean differences were significantly different from zero for each tooth ($P < .01$). The same experimental procedure was carried out on the mandibular test teeth, Nos. 19 to 24, on two days. For the mandibular teeth, the pre-post mean differences were significantly different from zero ($P < .001$) FOR EVERY ONE OF THE SIX TEST TEETH. Multiple-range test results on mean differences showed that the decrease in mobility on tooth No. 23 was significantly different ($P < .05$) from all other test teeth except No. 20. The amount of actual tooth contact that occurred during mastication is presumed to be small as the result of prior clinical observations. Thus the forces responsible for intrusion of the test teeth would appear to be primarily those transmitted through the food bolus and those occurring during deglutition. (Author)

PB-169 097 **Field 6E**
CFSTI Prices: HC$4.00 MF$0.75
Biological Sciences Communication Project, George Washington Univ., Washington, D. C.
JAPANESE BIO-MEDICAL SERIALS: THEIR IDENTIFICATION AND AN ANALYSIS OF THEIR CONTENTS,
by Mildred Benton, Charles W. Shilling, Kay Kitagawa, Miriam Huddle, and Mabel Doyle. Dec 65, 109p BSCP-23-65
Grant PHS-GM-11711-02

Descriptors: (*Medicine, Japan), (*Periodicals, Medicine).

PB-169 966 **Field 6E, 5A**
CFSTI Prices: HC$3.00 MF$0.75
Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
BIBLIOGRAPHY AND REFERENCES FOR STUDIES BASIC TO CONSIDERATION OF ARTIFICIAL HEART RESEARCH AND DEVELOPMENT PROGRAM.
Final rept.
11 Feb 66, 128p SVHSER3871
Contract PH-43-66-20

Descriptors: (*Heart, Mechanical organs), (*Mechanical organs, Medical research), Bibliographies, Surgical techniques, Prosthetics, Cardiovascular diseases, Implants, Research program administration.

ABCC-64-65 See Field 6R

AD-633 469 See Field 6A

AD-634 099 See Field 15B

PB-170 453 See Field 6M

6F. ENVIRONMENTAL BIOLOGY

AD-633 782 **Field 6F**
CFSTI Prices: HC$1.10 MF$0.50
Armour Research Foundation, Chicago, Ill.
DEVELOPMENT OF AN ORALLY EFFECTIVE INSECT REPELLENT.
Rept. for 1 May-31 Jul 62,
by Harbans Lal. 31 Jul 62, 4p Rept. no. C-222-1
Contract DA 49-193-MD-2281

Descriptors: (*Insect repellants, Effectiveness), Culicidae, Physical properties, Chemical properties, Aedes, Eggs, Larvae, Tests, Radioactive isotopes, Skin, Ingestion (Physiology).

The objective of the research program is to develop orally administered insect repellents affording better and longer-lasting protection than conventional surface repellents. Current efforts are concerned with securing selected surface repellents, establishing certain physico-chemical properties of these chemicals and the development of a mosquito colony. (Author)

AD-634 047 See Field 6D

AD-634 095 See Field 4B

AD-634 096 See Field 8F

AD-634 097 See Field 8F

AD-634 099 See Field 15B

6G. ESCAPE, RESCUE, AND SURVIVAL

AD-633 965 See Field 17G

6H. FOOD

N66-22377 **Field 6H**
CFSTI Prices: HC$6.00 MF$1.25
Schwarz Bioresearch, Inc., Orangeburg, N. Y.
SUPERIOR DIET FOR MAN IN SPACE.
Annual rept., Oct 64-Oct 65,
by N. A. Rosenthal. Apr 66, 220p
Contract NASw-517
NASA CR-71817

Descriptors: *Space food, *Diet.

PB-169 984 **Field 6H, 7E, 18H**
CFSTI Price: HC$1.60
Hormel Inst., Univ. of Minnesota, Austin.
STUDY OF FACTORS INFLUENCING OXIDATION WHICH OCCUR IN IRRADIATED FATS. EFFECT OF HIGH ENERGY IRRADIATION ON THE STABILITY OF FATS.
Progress rept. no. 3, 1 Jan-30 Jun 60,
by W. O. Lundberg. 30 Jun 60, 11p
Contract DA-19-129-QM-1350,
Proj. DA-7-84-01-002
AD 251 575

Descriptors: (*Antioxidants, Radiation effects), (*Radiation effects, Fats), (*Fats, Radiation effects), Stability, Oxidation, Gamma rays, Storage, Oxygen, Dose rate.

The stability of fats is decreased by irradiation and the decrease is proportional to the irradiation dose. Irradiation under oxygen is much more deleterious than irradiation under vacuum. The decrease in stability is largely due to destruction of antioxidants but another effect is indicated by the stability decrease observed when pure methyl linoleate containing no antioxidant was irradiated. The stability of methyl linoleate irradiated under oxygen can be improved by addition of antioxidants after irradiation, and the stability of lard or corn oil irradiated under oxygen increases during postirradiation storage. (Author)

AD-633 860 See Field 6N

PB-170 053 See Field 5C

PB-170 315 See Field 5C

PB-170 324 See Field 5C

PB-170 327 See Field 5C

6J. INDUSTRIAL (OCCUPATIONAL) MEDICINE

AD-634 037 See Field 5J

6L. MEDICAL AND HOSPITAL EQUIPMENT

PB-169 000 **Field 6L, 15B**
CFSTI Prices: HC$1.00 MF$0.50
Chemical Corps Medical Labs., Army Chemical Center, Md.
COMPARISON OF VENTILATION OF A HIGH RESISTANCE -LOW COMPLIANCE PNEUMATIC SYSTEM (GAS CASUALTY MODEL) BY MOUTH-TO-MASK INSUFFLATION AND BY A PORTABLE HAND BELLOWS.
Research rept.,
by John A. Clements, R. P. Johnson, and Robert Beaton. Jun 54, 22p MLRR-290
Proj. CMLRE-ML-52

Descriptors: (*Artificial respiration, Effectiveness), Medical equipment, Pneumatic devices, Bellows, Portable, Casualties, Nerve agents, Respiration, Fatigue (Physiology).

The object of the research was to test the mouth-to-mask insufflation (M-MI) and a modified hand bellows resuscitator on an artificial severe nerve gas casualty using healthy young males as operators. Twenty volunteers maintained adequate ventilation of the casualty for 30 min., by each method. Minute volume, tidal volume, and breathing frequency were well regulated in both methods. Evidence of fatigue occurred in both but was not sufficient to render ventilation inadequate in either. Mild hypocapnia occasionally occurred with M-MI but did not interfere significantly with casualty ventilation. All volunteers complained of difficulty in maintaining the mask seal. This was more pronounced with the bellows. (Author)

AD-472 550 See Field 6S

AD-634 045 See Field 6E

6M. MICROBIOLOGY

AD-633 666 **Field 6M, 6A**
CFSTI Prices: HC$6.00 MF$1.25
Foreign Technology Div., Wright-Patterson AFB, Ohio.
METABOLIC PHYSIOLOGY OF MICROORGANISMS AND THE EVOLUTION OF FUNCTIONS,
by V. N. Shaposhnikov. 17 Feb 66, 220p FTD-TT-65-616
TT 66-61404
Unedited rough draft trans. of mono. Fiziologiya Obmena Veshchestv Mikroorganizmov v Svyazi s Evolyutii Funktsii, Moscow 1960 163p.

Descriptors: (*Microorganisms, Metabolism), Biochemistry, Physiology, Photosynthesis, Biosynthesis, Lactic acids, Fatty acids, Formic acids, Carbohydrates, Oxygen, Carbon dioxide, Hydrogen, Oxidation, Bacteria, Respiration, Genetics, Oxidation-reduction reactions, Culture media, Ecology, Adaptation (Physiology), USSR.

CONTENTS: Scientific terminology; Physiological and biochemical characteristics of microorganisms; carbon dioxide in metabolism; a. photosynthesis; b. heterotrophic photoassimilation; c. autrotrophic chemosynthesis; d. heterotrophic chemoassimilation of carbon dioxide; autotrophic and heterotrophic form of life; hetertrophic form of

life; some moments in the history of the development of fermentation studies; homofermentative lactic acid fermentation; interrelation of fermentative processes with constructive metabolic processes; heterofermentative lactic acid fermentation; butyric acid fermentation; condensation reactions in fermentations; practical importance of diphase metabolism in microorganisms; participation of molecular oxygen in metabolism; biological oxidation.

AD-634 057 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
AN IMPROVED METHOD FOR THE RADIOISOTOPIC LABELING OF POLIOVIRUS AND VACCINIA VIRUS.
Progress rept. for Feb-Jun 65,
by David J. Giron. Mar 66, 10p SAM-TR-66-29
Proj. AF-7754,
Task 775402

Descriptors: (*Viruses, *Labeled substances), Radioactive isotopes, Poliomyelitis virus, Vaccinia virus, Nucleic acids, Synthesis, Desoxyribonucleic acids, Thymidines.

Identifiers: Fluorodeoxyuridines, Actinomycins.

The nucleic acid inhibitors, actinomycin D and 5-fluorodeoxyuridine (FUDR), were used to direct more radioisotopic label (P32 and C14) into viral nucleic acid. Phosphorus-starved HeLa cells were treated for 1 hour with 5 micrograms/ml. actinomycin D, infected with poliovirus, and then labeled with P32-dihydrogen phosphate. L cells were infected with vaccinia virus and DNA synthesis was immediately stopped by the addition of Fudr. C14-thymidine was added 6 hours after infection. It was found that actinomycin D increased the labeling efficiency by a factor of 20 and that FUDR increased it by a factor of 100. (Author)

N66-22194 **Field 6M**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
FACTORS AFFECTING FATTY ACID SYNTHESIS IN CELL-FREE PREPARATIONS FROM SACCHAROMYCES CEREVISIAE,
by H. P. Klein, and D. White. 1964, 11p NASA-TM-X-56530

Descriptors: *Fatty acid, *Saccharomyces, *Synthesis, *Chemical compound, *Lipid metabolism.

PB-170 453 **Field 6M, 6E**
CFSTI Prices: HC$1.00 MF$0.50
Microbiological Associates, Inc., Bethesda, Md.
GROWTH AND CHARACTERISTICS OF IN VITRO CULTURES DERIVED FROM HUMAN TUMORS OF THE HEAD AND NECK.
Semi-Annual Contract progress rept., 1 Sep 65-1 Mar 66,
by Aaron E. Freeman, and Thomas G. Ward. 1 Mar 66, 7p
Contract PH43-63-81

Descriptors: (*Neoplasms, Tissue culture cells), (*Tissue culture cells, Neoplasms), Viruses, Antigens + antibodies, In vitro analysis, Head, Humans, Viability, Cancer, Throat, Mouth, Lungs, Fluorescent antibody techniques.

The growth of head and neck tumor cells in tissue culture offers an interesting system for the possible isolation of viruses, particularly adenoviruses, with oncogenic properties. The successful unmasking of elusive human tumor viruses has not been reported, but most of this work was conducted using infectivity as an index and as a method for isolating the virus. With the development of serological methods for detecting virus specific complement-fixing and fluorescent antibody staining antigens, however, it may now be possible to demonstrate the presence of subviral components. The growth of the tumor cells in tissue culture provides a possible selective system for the isolation and testing of the antigenic cell. The current report discusses methods for growing the tumor cells in vitro and includes a partial characterization of the derived cells. (Author)

AD-462 148 **See Field 11J**

AD-633 532 **See Field 8A**

AD-633 917 **See Field 6E**

AD-634 099 **See Field 15B**

6N. PERSONNEL SELECTION AND MAINTENANCE (MEDICAL)

AD-633 860 **Field 6N, 6P, 6H**
CFSTI Prices: HC$3.00 MF$0.75
Rand Corp., Santa Monica, Calif.
A DOCUMENTARY ON WEIGHT, DIET AND EXERCISE,
by Robert C. Drebelbis. May 66, 91p P-3196-1

Descriptors: (*Body weight, Determination), (*Diet, Physiology), (*Exercise, Physiology), Physical fitness, Weight.

The paper presents authentic scientific data on correct weight, diet and exercise as essential to physical fitness and general good health. It contains a chart to determine your metabolism or the calories per day that you will require to lose weight and then to maintain a desired level. A complete nutritive calorie chart of foods arranged in alphabetical order is included. The caioric value of the foods listed is shown in convenient measurements of average portions or servings. There is a conversion table which relates weights and measurements to standard food portions in daily use. The document is organized into two parts; Part I deals with weight and diet and Part II discusses exercise and physical fitness. Part II also includes a series of Back Flexion Exercises recommended for those individuals who suffer recurring back problems. (Author)

PB-169 166 **See Field 6S**

PB-169 167 **See Field 6S**

6O. PHARMACOLOGY

AD-634 054 **Field 6O, 6P**
CFSTI Prices: HC$1.00 MF$0.50
School of Aerospace Medicine, Brooks AFB, Tex.
A METABOLIC ASPECT OF THE EFFECT OF ALTITUDE ON D-AMPHETAMINE IN THE RAT.
Preliminary progress rept., Oct 65-Jan 66,
by Albert T. Bernardini. Apr 66, 10p SAM-TR-66-42
Task 630207

Descriptors: (*Amphetamines, Excretion), (*High altitude, Amphetamines), Oxygen, Urine, Metabolism, Pharmacology, Rats.

Measurement was made of unchanged d-amphetamine excreted in urine from rats at a simulated altitude of 18,000 feet with 46% environmental oxygen maintained. Findings indicated no significant difference when compared to amphetamine in urine from rats injected with amphetamine at ground level. (Author)

6P. PHYSIOLOGY

AD-633 561 **Field 6P**
CFSTI Prices: HC$1.10 MF$0.50
Goteborg Univ. (Sweden). Dept. of Physiology.
NERVOUS CONTROL OF THE CIRCULATION.
Final technical rept. 1 Sep 59-31 Aug 61,
by Bjorn Folkow. 15 Oct 61, 20p
Contract AF 61 (052)-286
Availability: Microfiche only after original copies exhausted.

Descriptors: (*Blood circulation, *Autonomic nervous system), Cardiovascular system, Blood vessels, Musculoskeletal system, Reflexes, Capillaries, Chemoreceptors, Inhibition, Emotions, Syncope, Vasoactive agents, Blood pressure, Hydrostatic pressure, Intestines, Kidneys, Nerve cells, Sweden.

Studies were made of the nervous and humoral control of functionally different compartments of the vascular bed, including the influence exerted by reflex and central mechanisms. (Author)

AD-633 629 **Field 6P, 6S**
CFSTI Prices: HC$1.00 MF$0.50
Naval Aerospace Medical Inst., Pensacola, Fla.
THOUSAND AVIATOR STUDY: NONVESTIBULAR CONTRIBUTIONS TO POSTURAL EQUILIBRIUM FUNCTIONS,
by Alfred R. Fregly, Albert Oberman, Ashton Graybiel, and Robert E. Mitchell. 17 Mar 66, 18p
NAMI-956
NASA Order-R-136
NAVMED MF022.03.02-5007-10
Research supported in part by PHS.

Descriptors: (*Equilibrium, *Posture), Aging (Physiology), Medical examination, Aviation medicine, Space medicine, Correlation techniques, Anthropometry, Pulse rate, Exercise, Tobacco, Smokes.

In a preliminary study of nonvestibular sources of variance in the postural equilibrium functioning of a group of middle-aged males, twenty-eight of thirty-eight selected measures were shown to be related to one or another of three postural criteria. Outstanding among these, in descending order of magnitude, are: abdominal circumference, age, endomorphy, heart rate immediately after exercise, and duration of cigarette smoking. These and other findings are discussed in terms of their implications for vestibular and gerontological research. (Author)

AD-633 845 **Field 6P**
State Univ. of New York, Brooklyn. Downstate Medical Center.
DL-LYSINE-H3 UPTAKE IN 'LIGHT' AND 'DARK' NEURONS OF THE INFERIOR OLIVARY NUCLEUS OF EUTHYROID AND DYSTHYROIDAL RATS,
by D. H. Ford, and A. Rhodes. 31 May 65, 5p
Contract Nonr-4018 (01), Grant PHS-NB-456802
Proj. NR-101-592

Descriptors: (*Nerve cells, *Tritiated compounds), Brain, Thyroid gland, Central nervous system, Autoradiography, Labeled substances, Nervous system, Physiology, Diseases, Amino acids, Rats.

Identifiers: Lysines.

Uptake of DL-Lysine-H3 into 'light' and 'dark' cells of the rat inferior olivary nucleus was studied by radioautographiy. Uptake in 'light' cells was higher than in 'dark' cells and appears to be possibly related to the greater frequency of relationship with glial satellites. Dysthyroidal states were also observed to increase uptake of radioactivity which was prominently observed in hypothyroid rats. Since 'dark' cells appear to take up less lysine than normal cells and are less frequently closely associated with glial satellites it is suggested these cells may represent a less physiologically active unit than the 'light' cells rather than being simply 'artifactually' produced by the procedures employed. (Author)

AD-633 924 **Field 6P, 6D, 12A**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
STATISTICAL TECHNIQUES FOR DETECTING AND CLASSIFYING NEURONAL INTERACTIONS,
by Donald H. Perkel. Jun 66, 40p RM-4939-PR
Contract AF 49 (638)-1700

Descriptors: (*Statistical analysis, *Biometry), (*Nervous system, Physiology), Nerve cells, Cybernetics, Bionics.

An examination is made of mathematical techniques for comparing two simultaneously recorded neuronal spike trains and a presentation of a computer simulation using these techniques. (Author)

AD-633 935 **Field 6P**
Naval Submarine Medical Center, Groton, Conn.
EFFECT OF STIMULUS DURATION ON THE PERCEPTION OF RED-GREEN AND YELLOW-BLUE MIXTURES,
by S. M. Luria, and Seymour Weissman. 12 Apr 65, 9p Rept. no. 461
NAVMED MF022.03.03-9006.44

Descriptors: (*Colors, *Visual perception), Vision, Time, Sensitivity, Display systems, Signal lights, Mixtures.

The study investigated the perception of the four basic colors: red, yellow, green, and blue, as a function of the duration of the flash of light for both direct and off-center viewing. The aim was to determine what changes in color perception occur as the duration is decreased and what color confusions are the most common. The exposure was varied from .3 sec. to .02 sec. It was found that sensitivity to red and green remained rather unaffected by the decrease in exposure time when the lights were viewed directly, but declined if viewed off-center. Sensitivity to yellow got worse as the duration decreased, for both conditions of viewing. Sensitivity to yellow got worse as the duration decreased, for both conditions of viewing. Sensitivity to blue decreased with intermediate exposure times and then increased again as the duration of the flash was further shortened. It was also found that at short durations pure green flashes often looked blue, and pure yellow flashes looked red. These results should be considered in the selection of colors to be used for warning lights, flashing signals, navigational aids, or any signal light which will be seen only briefly. Yellow should be avoided; and green and blue should not be used in a display where they must be differentiated. (Author)

AD-633 960 **Field 6P**
CFSTI Prices: HC$3.60 MF$0.50
Bolt Beranek and Newman, Inc., Cambridge, Mass.
NEURAL MECHANISMS OF SENSORY DISCRIMINATION.
Final rept., 1 Dec 61-30 Jun 63,
by W. D. Neff. 30 Jun 63, 40p Rept. no. 1126
Contract Nonr-3681 (00)
Proj. NR-144-608

Descriptors: (*Auditory perception, Nervous system), Hearing, Brain, Excision, Physiology, Cerebral cortex, Sound, Pitch discrimination, Behavior, Electrophysiology, Psychophysiology, Learning, Speech recognition, Cats, Monkeys.

A detailed report of research on localization of sound in space after transection of auditory pathways in the tectum is given. The ability to localize sound in space was measured in a series of patients who had parts of the temporal lobe removed unilaterally and in patients with removal of cortex of the frontal lobes. One patient, had a right hemispherectomy. Three of the patients with temporal lobe ablation made poorer scores than normal subjects or patients with frontal lobe damage. The others made scores as good as some normal subjects. The patient with right hemispherectomy localized a noise source with surprising accuracy, an average error (for light spot placed at estimated source of sound) of about 5 degrees. There was some tendency for localization to be poorer in the auditory field opposite the side of lesion. An attempt was made to discover the areas of association cortex of the temporal lobes that are involved in learning auditory and visual discriminations. In the cat, isolation of auditory areas A1, AII, and Ep from insular-temporal and from other cortex by ablating a band of insular-temporal and from other cortex by ablating a band of surrounding cortical tissue does not affect pattern discrimination. There is no temporary amnesia for the learned habit. In the monkey, new experiments confirmed the finding of earlier experiments that auditory pattern discrimination is impaired but can be relearned after bilateral removal of the anterior part of the superior surface of the superior temporal convolution, a region of cortex that receives projection from the dorsal posterior portion of the lateral geniculate body. (Author)

AD-633 967 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Brussels Univ. (Belgium).
NEUROPHYSIOLOGIC CORRELATES OF SENSORY PERCEPTION.
Final scientific rept. 1 Feb 65-31 Jan 66,
by John E. Desmedt. 15 Mar 66, 14p
Grant AF-EOAR-57-65
AFOSR 66-0929

Descriptors: (*Sensory perception, *Nervous system), Auditory perception, Physiology, Nerve cells, Ear, Strychnos alkaloids, Inhibition, Pharmacology, Cerebral cortex, Psychophysiology, Auditory signals, Stimulation, Electrophysiology, Decision making, Stress (Psychology), Performance (Human), Neuromuscular transmission, Motor reactions, Monkeys, Cats, Pigeons, Humans, Belgium.

The functional capabilities and mode of operation of several parts of the feedback neural circuits related to acoustic sensory processing were further investigated in several animal species. The neurochemical properties of the efferent cochlear system of the bird have been defined, showing a.o. that strychnine and brucine block the efferent neural influence on the inner ear though with modalities different from those in mammals. The efferent inhibition behaves pharmacologically as a postsynaptic inhibition. In monkeys, the organization of corticofugal projections from the temporal areas of the cerebral cortex were investigated in detail with the Nauta and other technics. In related studies, psychophysiological methods were developed to assess the capabilities of monkeys namely in their dealing with complex acoustic stimuli. In the cat, the studies on acoustic system were mainly concerned with the correlation of physiological evidence related to centrifugal pathways of the auditory system with the anatomical studies performed with Nauta technic. Another series of experiments were made on human subjects in order to demonstrate objective changes in cerebral electrogenesis related to the performance of decision tasks. Clear-cut modifications of components of the sensory evoked potentials averaged by digital computers were described and used in the analysis of the cerebral mechanicsms underlying signal detection. (Author)

N66-21438 **Field 6P**
CFSTI Prices: HC$1.00 MF$0.50
Cedars of Lebanon Hospital, Los Angeles, Calif. Inst. of Medical Research.
A TECHNIQUE FOR TESTING HEART FUNCTION BY ANALYSIS OF ITS VIBRATION SPECTRUM.
Progress rept. 31 Jul-31 Dec 65,
by C. M. Agress. 1965, 14p
Grant NsG-289
NASA CR-71524

Descriptors: *Heart function, *Cardiovascular system, *Vibrational spectrum.

N66-22171 **Field 6P**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
SOME OBSERVATIONS ON SECONDARY ASCENDING AFFERENT SYSTEMS IN THE CENTRAL NERVOUS SYSTEM,
by W. R. Mehler. 1964, 38p NASA-TM-X-56069

Descriptors: *Central nervous system, *Neurology, *Pain.

AD-633 760 See Field 6S

AD-633 833 See Field 17B

AD-633 851 See Field 17B

AD-633 853 See Field 17B

AD-633 855 See Field 17B

AD-633 860 See Field 6N

AD-634 054 See Field 6O

PB-170 368 See Field 13B

6Q. PROTECTIVE EQUIPMENT

AD-633 631 **Field 6Q**
CFSTI Prices: HC$2.00 MF$0.50
Earth Sciences Div., Army Natick Labs., Mass.
CLOTHING ALMANAC FOR SOUTHEAST ASIA.
Technical rept.,
by Robert L. Anstey. Jan 66, 42p ES-22
Proj. DA-1V025001A129
USA-NLABS TR-66-20-ES

Descriptors: (*Clothing, Southeast Asia), (*Military requirements, Clothing), Army personnel, Protective clothing, Environment, Climatology, Disease vectors, Poisons, Reptiles, Insects, Bites + stings, Plants (Botany), Trees, Mountains, Periodic variations.

The Clothing Almanac supplements TA 50-902, mobilization, dated 3 April 1963. Monthly military clothing requirements are given for Southeast Asia, including the countries of Burma, Laos, Cambodia, Malaysia, Thailand, and Viet Nam This region covers portions of Clothing Allowance Zones I and II, which are further divided into mountainous and non-mountainous clothing requirement areas. In general, the environmental conditions of the lowland areas in the southern half of this region require the use of Zone I clothing throughout the year. Zone II clothing is required in lowlands in the northern half of this region. Mountainous areas generally require the use of items listed for the next colder zone, or any additional item required for troop protection. Clothing items are grouped alphabetically in tables for each area. A map is provided at the back of the report to indicate the extent of each area in Southeast Asia. The almanac includes a summary of physical features of the region, high elevations, climate, biotic conditions and the relation of these features to the issue of special clothing items. (Author)

AD-633 952 **Field 6Q**
CFSTI Prices: HC$2.00 MF$0.50
Systems Engineering Group, Research and Technology Div., Wright-Patterson AFB, Ohio.
EVALUATION OF IMPROVED EXHALATION VALVE FOR HGU-8/P FLYING HELMET.
Final rept. Aug 63-Dec 65,
by Donald R. Good. Apr 66, 33p SEG-TR-66-7
Proj. AF-913A-0000-97144

Descriptors: (*Helmets, Flight clothing), (*Exhaust valves, Helmets), Pressure suits, Performance (Engineering), Design, Respiration.

Identifiers: Evaluation.

The report records the results of a component improvement program on an exhalation valve for the HGU-8/P partial pressure suit helmet. The program was intended primarily to eliminate the tendency for sudden pressure loss within the helmet caused by improper and erratic closing characteristics of the exhalation valve and to meet additional design objectives of greater opening sensitivity, lower pressure drops during flow conditions, and an overall increase in reliability. The valve and its function are described. Internal friction of moving parts was reduced. The opening or 'cracking' pressure was reduced and the differential pressure under flow conditions was improved significantly. Test procedures and results obtained during low temperature tests and room temperature tests at high altitude are presented. It is concluded that the improved design meets the initial objectives of the program. (Author)

6R. RADIOBIOLOGY

ABCC-64-65 **Field 6R, 18H, 15F, 6E**
CFSTI Prices: HC$4.00 MF$1.00
Atomic Bomb Casualty Commission, Hiroshima (Japan).
ATOMIC BOMB CASUALTY COMMISSION.
Annual rept., Jul 64-30 Jun 65, 30 Jun 65, 130p
Contract AT (49-1)-GEN-72

Descriptors: (*Nuclear warfare casualties, Radiobiology), (*Nuclear bombs, Radiation effects).

AD-451 037 **Field 6R**
CFSTI Price: HC$2.60
Naval Radiological Defense Lab., San Francisco, Calif.
ACCUMULATION OF LETHAL IRRADIATION DOSES BY FRACTIONATED EXPOSURE TO X-RAYS,
by J. S. Krebs, and R. W. Brauer. 22 Sep 64, 25p USNRDL-TR-784

Descriptors: (*Lethal dosage, X rays), Mice, Radiation tolerance, Recovery, Radiation injuries.

The LD50 of mice for exposure to daily fractionated irradiation has been measured for fractionation periods of from 5 to 60 days. The amount of recovery occurring during the fractionation was found to depend largely on the number of dose fractions, rather than on the size of fractions or the total time duration. The amount of recovery did not agree with the model involving exponential decay of injury with time after exposure. The results suggest that the biological basis for the recovery is the prompt repair of sublethal injury to vital cells of the mouse during the intervals between exposures to radiation. The existence of similar recovery patterns in previous studies of dose fractionation is pointed out. The relationship of the present pattern of radiation exposure to other patterns for chronic radiation exposure is discussed briefly. (Author)

AD-459 461 **Field 6R, 13A, 13M**
CFSTI Price: HC$3.60
Naval Radiological Defense Lab., San Francisco, Calif.
NON-INGESTED DOSE ASSOCIATED WITH PARTICULATE INGRESS INTO A PROTOTYPE SHELTER VIA THE VENTILATION SYSTEM,
by M. M. Bigger, R. J. Crew, and R. K. Fuller. 20 Jan 65, 39p USNRDL-TR-815
Research sponsored in part by Office of Civil Defense, Contract OCD-OS-62-36.

Descriptors: (*Radioactive fallout, Penetration), (*Fallout shelters, Radiological contamination), (*Ventilation, Fallout shelters), Radiological dosage, Radiation measurement systems, Particle size.

Particulate penetration into the experimental shelter via the ventilation system operating without filters was determined as a function of particle size. Relatively good agreement was found with the small amount of applicable Shot Small Boy data. Estimates of the dose within a shelter due to particulate penetration and deposit (ingress dose) were made using values of fallout model parameters for weapon yields of 100 to 100,000 KT (assuming 100 % fission). Ingress doses are presented as a function of particle size and downwind distance so that the particle sizes of importance may be determined for any given acceptable ingress dose. (Author)

AD-633 606 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
INJURY ACCUMULATION IN SHEEP DURING PROTRACTED GAMMA RADIATION,
by G. F. Leong, N. P. Page, E. J. Ainsworth, and G. E. Hanks. 24 Mar 66, 22p USNRDL-TR-998
Tasks 2431C, NWER-A4d

Descriptors: (*Mammals, *Radiation injuries), Gamma rays, Radiological dosage, Dose rate.

Identifiers: Sheep.

The study describes the injury accumulation and recovery in sheep exposed to Co60 gamma rays (2/3 LD50/30) at dose rates of 0.5 to 3.9 R/hour. Immediately following the protracted exposure (165 R), no injury as defined by the lethality of a second exposure could be detected for those animals exposed to gamma radiation at dose rates of 0.5 and 0.95 R/hour. However, when animals were subjected to a similar total protracted exposure but at dose rates of 1.85 and 3.9 R/hour, significant amounts of injury could be detected immediately following the protracted exposure. Approximately 75 R (45%) and 104 R (63%) of the remaining injury was detected in animals exposed at dose rates of 1.95 and 3.9 R/hour, respectively. This suggests a threshold exposure rate, probably between 1.0 and 1.85 R/hour, for injury accumulation in sheep. Further experiments to relate the size of the conditioning exposure (protracted) to injury accumulation indicate that at an exposure rate of 3.6 R/hour, injury accumulation is a linear function of the total protracted dose. (Author)

AD-633 620 **Field 6R**
CFSTI Prices: HC$4.00 MF$1.00
California Univ., San Francisco. Dept. of Neurology.
CENTRAL NERVOUS SYSTEM RESPONSE TO LOW-LEVEL X-IRRADIATION.
Final rept.,
by Crawford F. Sams. Dec 65, 148p
Contract OCD-OS-62-148
Proj. 2431A
Also announced as PB-170 579.

Descriptors: (*Central nervous system, Radiation effects), (*Radiation effects, X rays), Electrophysiology, Dogs, Nerve cells, Radiological dosage.

An electrophysiological response of the CNS of dogs manifested by high-voltage, erratic spiking and bilateral asynchrony was shown to exist following low-level head-only x-irradiation of 1 - 100 rad. Evidence obtained in a study of possible mechanisms involved is consistent with nerve cell membrane permeability changes. (Author)

AD-633 639 **Field 6R, 15F, 13B, 13D K**
CFSTI Prices: HC$1.60 MF$0.50
Army Engineer Research and Development Labs., Fort Belvoir, Va.
EVALUATION OF U. S. ARMY FIELD WATER SUPPLY EQUIPMENT AND OPERATIONS,
by D. C. Lindsten, and H. N. Lowe Jr. 15 May 52, 20p
AFSWP. WT-340
Rept. on Operations JANGLE, Proj. 6.8.

Descriptors: (*Water supplies, *Radiological contamination), Water tanks, Decontamination kits, Decontamination, Nuclear explosions damage, Radioactive fallout, Purification, Nylon, Army equipment.

Identifiers: Jangle operation.

An investigation was conducted under Project 6.8, Operation JANGLE to determine the resistance of coated fabric water tanks to the blast and thermal effect of an atomic burst on the surface of the ground, to evaluate a standard U. S. Army water purification unit for removing radioactive contamination from water and to determine if field water supplies may become contaminated following a surface or underground burst. U. S. Army 3000 gallon GRS coated nylon fabric water tanks filled with water were undamaged at a distance of 500 yards from ground zero for a 1.2 KT atomic ground surface burst. Thus these tanks withstood overpressure as high as 5 psi and thermal flux of 20 cal/sq cm. U. S. Army Water Purification Equipment, Diatomite Pack (Man), 15 GPM, Set No. 2, was found capable of removing 84.5 per cent of the activity of a field water supply deliberately contaminated to greater than seven times the safe drinking tolerance. A field water supply may become contaminated to a significant degree as a result of fall-out of radioactive material following a surface or underground atomic burst if in a down-wind position from the burst. (Author)

AD-633 876 **Field 6R, 18C**
CFSTI Prices: HC$7.60 MF$0.75
School of Aviation Medicine, Randolph AFB, Tex.
OCULAR EFFECTS OF THERMAL RADIATION FROM ATOMIC DETONATION - FLASHBLINDNESS AND CHORIORETINAL BURNS,
by Victor A. Byrnes, D. V. L. Brown, H. W. Rose, and Paul A. Cibis. 30 Nov 55, 73p WT-745
Proj. 4.5
PB 155 635
Report on Operation Upshot-Knothole, March-June 1953.

Descriptors: (*Nuclear explosions, *Flashblindness), (*Radiation injuries, Eye), Radiation effects, Retina, Thermal radiation, Burns, Night sky, Military personnel, Performance (Human), Vision, Visual acuity, Adaptation (Physiology), Illumination, Infrared filters.

Identifiers: Upshot-Knothole operation.

The project was designed to determine the effect of the flash of atomic detonations at night upon the ability of military personnel to carry out their assigned tasks when such tasks involve the use of vision. It is considered that in general three types of visual tasks are involved in military operations: (a) reading of instruments in ships, aircraft, tanks, and vehicles; (b) central acute vision at low levels of illumination; and (c) peripheral vision at very low levels. After an atomic flash each individual involved in such military visual tasks would attempt to return to seeing under the light level then available to him. The time required for him to see under each of these circumstances was determined. When the eye observes an atomic fireball, the energy received in the retinal image per unit time and area depends on the relative opening of the eye (pupillary diameter divided by focal length) and the energy emitted by the fireball per unit area. Due to the concentration of energy in the image formed on the retina, skin burns and retinal burns follow different laws. As a result of this concentration retinal lesions are produced at distances many times greater than those for minimal skin burns.

AD-634 027 **Field 6R, 14B**
CFSTI Prices: HC$3.00 MF$0.50
Technology, Inc., San Antonio, Tex.
RESEARCH FOR OCULAR EFFECTS OF THERMAL RADIATION.

Final rept.,
by Thomas A. Alexander, Roger L. Bessey, and Earl R. Lawler Jr. Dec 65, 55p
Contract AF 41 (609)-2464
Proj. AF-6301
Task 630103

Descriptors: (*Radiation injuries, Eye), (*Retina, Burns), Xenon lamps, Sources, Flash lamps, Radiation effects, Equations, Mathematical prediction, Thermal radiation, Thresholds (Physiology), Ophthalmology, Test equipment, Rabbits.

To study minimal retinal burns in test rabbits, Technology Incorporated designed and fabricated a solid-state circuit to pulse a xenon light source up to 5000 amperes for one millisecond. Procedures to irradiate the rabbits and to calibrate the light source are described. Data for 1.05-millimeter-diameter minimal retinal burns were obtained. For one rabbit, this data was plotted and a theoretical equation was fitted to the curve. This data and theoretical equation can now be used for the prediction of minimal retinal burns. (Author)

HASL-167 **Field 6R, 18H, 18D**
CFSTI Prices: HC$2.00 MF$0.50
Health and Safety Lab., New York Operations Office (AEC), N. Y.
AN EXPERIMENTAL DETERMINATION OF DIFFERENTIAL ENERGY AND ANGLE SPECTRA FOR 137 CS GAMMA-RAYS IN SAND,
by M. Alberg, K. Obrien, and J. McLaughlin. Feb 66, 35p

Descriptors: (*Radiation measurement systems, Gamma rays), (*Gamma rays, Sand).

K-1657 **Field 6R**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
SOME OBSERVATIONS ON FILM BADGE CALIBRATION TECHNIQUES,
by A. F. Becher, N. B. Schultz, and L. H. Sipe.
22 Apr 66, 13p
Contract W-7405-eng-26

Descriptors: (*Dosimeters, Calibration), (*Dose rate, Health, Physics instrumentation).

PB-169 171 **Field 6R**
CFSTI Prices: HC$2.00 MF$0.50
Commissariat a l'Energie Atomique, Chusclan (France). Centre de Production de Plutonium de Marcoule.
LA RADIOPROTECTION DES TRAVAUX SUR LES EXCHANGEURS DES PILES G. 2 et G. 3 (HEALTH PHYSICS DURING WORK ON THE G.2 AND G.3 REACTOR EXCHANGES),
by Jean Rodier, Jean Chassany, and Pierre Guillermin. Dec 65, 37p CEA-R-2870
Text in French; Attached Summary in English.

Descriptors: (*Health physics, Radiation hazards), Nuclear reactors, Reactor safety systems, Radioactivity.

During this work and its preparation, which took place first at G.2 and then at G.3 over a period of 11 months, 15000 measurement results were obtained. Their analysis, together with a consideration of the organisation on the site and of the conclusions drawn from the experiment, shows the various factors which determine the importance of the radio-active dangers. (Author)

PB-169 869 **Field 6R**
CFSTI Prices: HC$1.60 MF$0.50
Commissariat a l'Energie Atomique, Fontenay-Aux-Roses (France). Centre d'Etudes Nucleaires.
EVALUATION PAR RESONANCE PARAMAGNETIQUE ELECTRONIQUE DU NOMBRE DE RADICAUX LIBRES PRODUITS DANS L'OS DE RAT IRRADIE (Evaluation by Electronic Paramagnetic Resonance of the Number of Free Radicals Produced in Irradiated Rat Bone),
by Georges Marble, and Ramon Valderas. Mar 66, 16p CEA-R-2910
Text in French; Attached Summary in English.

Descriptors: (*Bone, Radiation effects), (*Free radicals, Bone), Rats, Paramagnetic resonance, Gamma rays, Dosage.

The number of long half-life free radicals created by gamma irradiation in the bones of the rat has been determined from the electronic paramagnetic resonance spectrum. This number decreases slowly with time (calculated half life: 24 days). It is proportional to the dose of gamma radiation given to the rat. The method could find interesting applications in the field of biological dosimetry. (Author)

AD-633 469 **See Field 6A**

AD-634 093 **See Field 18F**

CEX-59.4.17 **See Field 18H**

CEX-61.6.2 **See Field 18H**

CEX-62.6.5 **See Field 18H**

HASL-171 **See Field 18H**

NAA-SR-11761 **See Field 18N**

6S. STRESS PHYSIOLOGY

AD-472 550 **Field 6S, 6L, 22B**
CFSTI Prices: HC$12.60 MF$1.00
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
BIOMEDICAL POTENTIAL OF A CENTRIFUGE IN AN ORBITING LABORATORY.
Final rept.,
by W. J. White, J. W. Nyberg, P. D. White, R. H. Grimes, and L. M. Finney. Jul 65, 129p SM-48502
Contract AF 04 (695)-679
SSD TDR-64-209-Suppl.

Descriptors: (*Space medicine, Centrifuges), (*Centrifuges, Space medicine), Acceleration tolerance, Stress (Physiology), Weightlessness, Body weight, Humans, Gravity, Exercise, Cardiovascular system, Space environmental conditions, Space crews, Maintenance personnel, Manned spacecraft, Space simulation chambers, Relaxation (Physiology), Motion sickness.

Identifiers: Orthostasis.

Five studies concerning the potential of a centrifuge in an orbital laboratory were conducted. The first three studies include consequences of heart-to-foot radients on tolerance to positive acceleration, a parametric study of the power requirements of a short radius centrifuge, and a technique utilizing the centrifuge for determining body mass in a null gravity state. The salient generalizations from studies in which bed rest was used as the analog of null gravity were presented. The fourth study was conducted to study the influence of periodic centrifugation as a method of alleviating physiological disturbances, with emphasis on the cardiovascular system, brought about by 20 days of bed rest. It was shown that motion sickness in the subjectw was not a problem when exposed to high angular rates of rotation. Deterioration produced by recumbency was alleviated by periodic centrifugation, and subjects exposed to ;4gz four times daily showed less lability of blood pressure than did those receiving less acceleration. The fifth study extended the results of the fourth study by increasing the integrated g-time, added approximately 700 kcal of exercise, and distributed the rides over a 24-hr period as contrasted with the 8-hr schedule of the prior study. A maintenance group started riding the centrifuge on the first day of bed rest. A therapy group started riding after 17 days of bed rest. A control group was not centrifuged. Periodic centrifugation tended to prevent cardiovascular deconditioning in the maintenance group as indicated by tilt-table responses in this group as compared to the noncentrifuged group.

AD-633 473 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
DISTRIBUTION OF PULMONARY BLOOD FLOW AS AFFECTED BY TRANSVERSE (;Gx) ACCELERATION.
Final rept.,
by Frederic G. Hoppin Jr., Elihu York, David E. Kuhl, and Richard W. Hyde. 31 Dec 65, 32p
NADC-MR-6517
Contract AT (30-1)-3175, Grant PHS-C-4456
NAVMED MR005.13-0002.18-2, NYO 3175-20

Descriptors: (*Lungs, *Acceleration tolerance), (*Blood circulation, Acceleration tolerance), Hydrostatic pressure, Radioactive isotopes, Blood vessels, Stress (Physiology).

The distribution of blood flow in the pulmonary vascular bed under +Gx (forward or transverse acceleration) was studied by the intravenous injection of radioactive 131 Iodinated-macro aggregated albumin (131I-MAA) in three normal subjects while they were under +1Gx, +4Gx and +8Gx on a human centrifuge. The resulting distribution of radioactivity in the lungs, representing the distribution of pulmonary blood flow at the time of injection, was assessed one to three hours later by lateral radioisotope scanning. The distribution of pulmonary blood flow was not markedly different at +1Gx, +4Gx, and +8Gx despite a hydrostatic gradient in pulmonary intravascular pressures estimated to be 88 mm Hg under +8Gx. These findings indicate that under +Gx (forward or transverse acceleration) unlike +Gz (headward or positive acceleration) the distribution of pulmonary blood flow is not markedly distorted, and that the regional flow of blood in the lung may not be significantly changed by high intravascular pressures. (Author)

AD-633 760 **Field 6S, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Universidad Peruana Cayetano Heredia, Lima. Instituto de Investigaciones de la Altura.
THE ROLE OF ADRENAL CORTEX IN THE PROCESS OF ACCLIMATIZATION TO HIGH ALTITUDES.
Annual rept., 1 May 65-30 Apr 66,
by Federico Moncloa. Apr 66, 20p Rept. no. 1
Grant DA-ARO-49-092-65-G89
Proj. DA-2N014501B71D-00-026-LA

Descriptors: (*Adrenal cortex, *Acclimatization), (*Adrenal cortex hormones, Secretion), Stress (Physiology), Steroids, Adrenocorticotropic hormone, Tolerances (Physiology), Hypoxia, Metabolism, Stimulation, Inhibition, High altitude, Half life, Dosage, Urine, Excretion, Equations, Peru.

Identifiers: Dexamethasone.

The results indicate that exposure to high altitude (4300 meters) causes a transitory increase in the adrenal cortex secretion of cortisol. The adrenal cortex can be further stimulated with exogenous ACTH during the first day of exposure to an environment of low oxygen tension. It is also possible to inhibit the adrenal cortex hyperactivity by dexamethasone administration. The biological half-life of a synthetic corticotrophin preparation was studied. Using a new formula for calculation results ranged between 19.4 and 38.7 minutes. (Author)

AD-633 968 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
Freie Universitaet Berlin (West Germany). Physiologisches Institut.
RESEARCH ON VOLUME CONDITIONED STIMULI AFFECTING SALT AND WATER EXCRETION.

Final scientific rept. 1 Feb 65-31 Jan 66,
by Otto H. Gauer. 31 Jan 66, 4p
Grant AF-EOAR-63-65
AFOSR 66-0928

Descriptors: (*Blood circulation, *Weightlessness), (*Space medicine, Excretion), Absorption (Biological), Simulation, Liver, Sense organs, Blood vessels, Posture, Reflexes, Lymph, Metabolism, Pituitary hormones, Space environmental conditions, Cats.

Identifiers: Diuresis, Water immersion.

Results of following investigations are given: Effects of Vasopressin on circulatory homeostasis during and after simulated weightlessness (water immersion); role of portal circulation in osmo- and volume control; vasopressin and lymph; reflex changes of the circulation during graded changes of transmural pressures. (Author)

AD-634 113 **Field 6S, 22A, 6C**
CFSTI Prices: HC$6.00 MF$1.25
Aerospace Technology Div., Library of Congress, Washington, D. C.
SOVIET BIOTECHNOLOGY AND BIOASTRONAUTICS, DECEMBER 1964-JUNE 1965: COMPILATION OF ABSTRACTS.
Rept. no. 2 on ATD work assignment no. 22,
by Christopher H. Dodge. 11 Feb 66, 234p
ATD-66-14
TT 66-61467
Based on Soviet-Satellite open sources pub. 1962-65. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Space biology, Abstracts), (*Space medicine, Abstracts), Vibration, Acceleration tolerance, Deceleration, Stress (Physiology), Radiobiology, Hypothermia, Decompression sickness, Hypoxia, Life support, Human engineering, Astronauts, Telemeter systems, Data processing systems, Space flight, Gravity (Artificial), Space environmental conditions, Man-machine systems, USSR.

The compilation of abstracts is based on Soviet-Satellite open sources published 1962-1965. It reflects Soviet research in the fields of space biology, bioastronautics, and biotechnology published for the most part during the last quarter of 1964 and the first two quarters of 1965. There are 132 entries in the form of indicative abstracts, expanded abstracts, and analytical reviews; these entries have been arranged in eleven parts according to subject: Part I. Effects of altered gravity (15 entries); Part II. Effects of vibration on physiological function (5 entries); Part III. Biological effects of radiation (12 entries); Part IV. Effects of hypothermia on mammals (7 entries); Part V. Effects of altered gas environments (34 entries); VI. Effects of combined stresses (12 entries); VII. Biomedical effects of space flight (6 entries); VIII. Life support systems (8 entries); IX. Human engineering and man-machine factors (11 entries); Part X. Monitoring, biotelemetry, and data processing (16 entries); Part XI. Miscellaneous: Future flights, exobiology, ecophysiology (6 entries). The first page of each part contains a list of the entries by number, title, and page number. Also included in the report are an alphabetical author index (including co-authors) and an alphabetical subject index. There is no bibliography. (Author)

N66-21682 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Los Angeles. Space Biology Lab.
CENTRAL NERVOUS, CARDIOVASCULAR AND VISUOMOTOR STUDIES RELATING TO SPACIAL ORIENTATION IN A 30-DAY PRIMATE FLIGHT,
by W. R. Adey. 1966, 40p
Grant NsG-502
NASA CR-71556

Descriptors: *Vestibular effect, *Visual control, *Cardiovascular system, *Central nervous system, *Space flight, *Spatial orientation.

N66-22246 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
EFFECTS OF HYPOHYDRATION ON WORK PERFORMANCE AND TOLERANCE TO PLUS GZ ACCELERATION IN MAN,
by E. G. Averkin, L. G. Douglas, M. Matter Jr., J. S. Bosco, and J. E. Greenleaf. 1965, 26p NASA-TM-X-56368
Prepared in cooperation with San Jose State Coll., Calif. Prepared for presentation at the Aerospace Med. Conv., New York, 26-29 Apr 1965.

Descriptors: *Human performance, *Physical work, *Acceleration tolerance, *Dehydration, *Visual accommodation.

N66-22247 **Field 6S**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
SPACE PHYSIOLOGY.
Final rept.
12 Nov 64, 28p
Contract NAS2-1357, Grant NsG-139-61
NASA CR-59790

Descriptors: *Bioinstrumentation, *Space environment, *Cardiovascular system, *Central nervous system, *Respiratory system.

N66-22265 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
EFFECTS OF ADRENALIN OR INSULIN ON THE PERFORMANCE OF WORKING AND RESTING SUBJECTS,
by C. R. Coler, D. R. Young, and W. A. McLaurin. 1965, 22p NASA-TM-X-56371
Prepared for presentation at the Aerospace Med. Convention, New York, 26-29 Apr 1965.

Descriptors: *Epinephrine, *Insulin, *Physiological effect, *Human performance, *Performance decrement.

N66-22360 **Field 6S**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley.
CHRONIC ACCELERATION STUDIES. PHYSIOLOGICAL RESPONSES TO ARTIFICIAL ALTERATIONS IN WEIGHT.
Final technical rept., 1962-1965,
by C. F. Kelly, and A. H. Smith. Apr 66, 10p
NASA Order-R-53
NASA CR-441

Descriptors: *Pathological effect, *Physiological response, *Acceleration stress.

PB-169 166 **Field 6S, 6N, 5J**
CFSTI Prices: HC$3.00 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
BIOMEDICAL SURVEY OF ATC FACILITIES. I. INCIDENCE OF SELF-REPORTED SYMPTOMS,
by George T. Hauty, David Trites, and William J. Berkley. Mar 65, 51p
AM 65-5

Descriptors: (*Air traffic controllers, Stress (Psychology)), Biometry, Stress (Physiology), Physical fitness, Medicine, Psychophysiology, Reaction (Psychology), Behavior, Periodic variations, Scheduling, Aviation medicine.

From six en route and six terminal air-traffic-control facilities selected on the basis of differences between shift-rotation schedules and high traffic volume; 300 journeymen and assistant controllers were selected as volunteer subjects to complete a biomedical inventory daily for a period of 90 consecutive days. The inventory elicited information relating to health, morale, behavioral habits, and side effects of medications. Of the 300 subjects, 209 fulfilled the reporting requirements of the 90 days. For one of the indexes of information--stress-related symptoms--analyses of the data revealed that: (1) Facilities did differ to a statistically significant degree in the incidence of reported symptoms but these differences could not be attributed to shift-rotation schedules; and (2) 8 hours or less between two successive shifts occasioned the highest incidence of reported symptoms and more than 24 hours between shifts the next highest. (Author)

PB-169 167 **Field 6S, 6N, 5J**
CFSTI Prices: HC$2.00 MF$0.50
Civil Aeromedical Research Inst., Oklahoma City, Okla.
BIOMEDICAL SURVEY OF ATC FACILITIES. 2. EXPERIENCE AND AGE,
by George T. Hauty, David K. Trites, and William J. Berkeley. Mar 65, 37p
AM 65-6

Descriptors: (*Air traffic controllers, Stress (Psychology), Biometry, Stress (Physiology), Physical fitness, Medicine, Psychophysiology, Reaction (Psychology), Aging (Physiology), Behavior, Periodic variations, Scheduling, Aviation medicine.

From six enroute and six terminal air traffic control (ATC) facilities selected on the basis of differences between shift-rotation schedules and high IFR traffic volume, 300 journeymen and assistant controllers were selected as volunteer subjects to complete a biomedical inventory daily for a period of 90 consecutive days. The inventory elicited information relating to health, morale, behavioral habits, and side effects of medications. Of the 300 subjects, 209 fulfilled the reporting requirements of the 90 days. For one of the indexes of information--stress-related symptoms--analyses of the data revealed that: (1) both length of experience in the air traffic control field and chronological age were related positively to the incidence of such symptoms; i.e., the greater the number of years of ATC experience and the greater the age of the subject, the higher the incidence of symptoms reported; and (2) of these two relationships, the higher and, therefore, the more significant relationship was the involving years of ATC experience. (Author)

AD-633 629 **See Field 6P**

AD-633 773 **See Field 6T**

AD-634 037 **See Field 5J**

AD-634 045 **See Field 6E**

6T. TOXICOLOGY

AD-633 773 **Field 6T, 6S**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
TOXIC EFFECT OF HIGH OXYGEN PRESSURES ON THE LIVING ORGANISM. REPORT NO. 3. NATURE OF SPASMODIC GASES IN WARM BLOOD ANIMALS, SUBJECTED TO THE EFFECT OF HIGH OXYGEN PRESSURES,
by S. I. Prikladovitskii. 17 Feb 66, 24p FTD-TT-65-966
TT 66-61416
Unedited rough draft trans. of Fiziologicheskii Zhurnal SSSR v20 n3 p507-17 1935.

Descriptors: (*Oxygen, Toxicity), Pressure, Stress (Physiology), Thresholds (Physiology), Aging (Physiology), Strychnos alkaloids, Dosage, Convulsive disorders, Poisoning, High-pressure research, Brain, Pressure breathing, Cerebral cortex, Stimulation, Mice, USSR.

A high oxygen partial pressure has various effects on young white mice depending upon their age. The intraperitoneal, subcutaneous and intracapital introduction of wormtree essence in adult white mice causes the appearance of spasma analogous to the ones which are detected during intravenal injection of the preparatus into dogs. The 'threshold' dosage of wormtree amounts for adult white mice is 0.025 g per 100 g of animal weight. Young white mice react to intraperitobal injection of wormtree differently, depending upon age. An intraperitonael introduction of strychnine solution (1:2000) in white mice causes accidents of typical 'Strychnine' pains. Three age brackets for the irritation of the cortex by electrical and chemical irritants can be established in white mice. In its totality these results confirm the assumption that spasma, which appear in warm blooded animals under the effect of high partial oxygen pressures, are the esult of an irritation in the cerebral cortex.

7A. CHEMICAL ENGINEERING

ANL-7055 **Field 7A, 18J**
CFSTI Prices: HC$6.00 MF$1.25
Argonne National Lab., Ill.
CHEMICAL ENGINEERING DIVISION SEMI-ANNUAL REPORT, JANUARY-JUNE 1965.
Oct 65, 234p
Contract W-31-109-eng-38

Descriptors: (*Reactor materials, Chemical engineering), (*Reactor system components, Reactor materials).

DP-1028 **Field 7A, 18I, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
PERFORMANCE OF ACTIVATED CARBON BEDS IN SRP REACTOR CONFINEMENT FACILITIES.
Progress rept., Sept 62-Sept 65,
by William S. Durant. Jan 66, 27p
Contract AT (07-2)-1

Descriptors: (*Iodine, Adsorption), (*Reactor operation, Carbon).

NYO-10740 **Field 7A, 18J**
CFSTI Prices: HC$2.00 MF$0.50
New York Operations Office (AEC), N. Y.
GAMMA SPECTROMETRIC MEASUREMENT OF 235 U IN 24-IN. X 24-IN. X 12-IN. ABSOLUTE AIR FILTERS AND ASSOCIATED ECONOMICS OF URANIUM RECOVERY,
by Alan M. Fishman, Ira Cohen, and Frances K. Durkan.15 Dec 65, 27p

Descriptors: (*Uranium, Recovery), (*Nuclear radiation spectrometers, Uranium).

ANL-6830 **See Field 18J**

7B. INORGANIC CHEMISTRY

AD-634 039 **Field 7B, 7C**
CFSTI Prices: HC$3.00 MF$0.75
Space/Defense Corp., Birmingham, Mich.
SURVEY OF METHODS FOR GAS ANALYSIS IN RESPIRATORY ATMOSPHERES.
Final rept.,
by Donald L. Foster, and Michael Brian. 20 Apr 65, 62p TR-65-102
Contract Nonr-4490 (00)

Descriptors: (*Atmosphere, *Gas analysis), (*Space environmental conditions, Atmosphere), Respiration, Air, Chemical analysis, Magnetic properties, Polarographic analysis, Thermal conductivity, Gas chromatography, Chromatographic analysis, Mass spectroscopy.

It appears that currently available equipment (or available equipment with minor modification) can be adapted to meet the most basic requirements for respiratory atmosphere analysis. However, the optimum characteristics desired are probably not intrinsic to currently available instrumentation. The most limiting factor appears to be the incapability of a single analytical technique to provide acceptable monitoring of the atmospheric composition. It is almost certain that in any system for atmosphere analysis it will be necessary to utilize equipment employing more than one of the analytical methods in use today.

AD-634 046 **Field 7B, 7C, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Newcastle-upon-Tyne Univ. (England). Dept. of Inorganic Chemistry.
COORDINATION CHEMISTRY OF GROUP III.
Final rept.,
by N. N. Greenwood. Jan 66, 5p
Grant AF-EOAR-79-64
AFOSR 66-0926
See also AD-412 485.

Descriptors: (*N-heterocyclic compounds, Boranes), (*Chemical compounds, Scientific research), (*Gallium compounds, *Complex compounds), Halides, Chemical bonds, Spectra (Infrared), Spectra (Visible ; ultraviolet), Raman spectroscopy, Oxides, Sulfides, Nuclear magnetic resonance, Great Britain.

Identifiers: Boratetrazoles, Diphenyl cyclotetrazeno boranes, Gallium halides.

A new series of boron-nitrogen heterocyclics of general formula RR'N4BH were synthesized and their ultraviolet, infrared and Raman spectra studied (AD-632 448). Theoretical calculations on the 6-electron pi system were compared with experimental results. Proton n.m.r. spectra of the following selected compounds were obtained: Et20.GaC13, Et20.GaBr3, Et2S.GaC13 and Et2S.GaBr2. When analysed correctly these indicate that GaC13 is a stronger acceptor than GaBr3 towards these ligands and that Et2S is a better donor than Et20 towards the gallium trihalides. Interferrometric techniques have been used with considerable success to determine heavy metal-halogen and metal- ligand vibration and deformation frequencies. Coupled with Raman data this has allowed convincing assignments to be made of the spectra obtained on new compounds.

AD-634 105 **Field 7B**
CFSTI Prices: HC$3.00 MF$0.75
Callery Chemical Co., Pa.
STUDIES OF COMPLEX PERCHLORATES.
Final rept.,
by C. R. Guibert, H. F. Klodowski, A. D. McElroy, andM. D. Marshall. 1 Jun 66, 72p
Contract Nonr-3943 (00)
Proj. NR-093-032
See also AD-430 803 and AD-607 947.

Descriptors: (*Perchlorates, *Complex compounds), (*Nitronium perchlorate, Spectra (Infrared)), Raman spectroscopy, Aluminates, Synthesis (Chemistry), Beryllium compounds, Zinc compounds, Boron compounds, Titanium compounds, Nitrates, Borates, Ions.

CONTENTS: Raman and infrared spectra of nitronium perchlorate, by J. W. Nebgen, A. D. McElroy, and H. F. Klodowski; Complex light metal perchlorates -- tetraperchlorato aluminates, by C. R. Guibert, H. F. Klodowski, M. D. Marshall, and A. D. McElroy; Complex perchlorates --hexaperchloratoaluminates, by C. R. Guibert, J. S. Hashman, H. F. Klodowski, and A. D. McElroy; Complex perchlorates--complexes of boron, beryllium, zinc and titanium, by C. R. Guibert, J. S. Hashman, H. F. Klodowski, and A. D. McElroy; Synthesis of the tetramitratoborate anion, by C. R. Guibert and M. D. Marshall; Appendix: The hexanitratoaluminate.

N66-22184 **Field 7B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MASS SPECTROMETRIC INVESTIGATION OF THE REACTIONS OF O-ATOMS WITH H2 AND NH3,
by A. E. Potter, and E. L. Wong. 26 Jan 65, 38p
NASA-TM-X-56452

Descriptors: *Ammonia, *Mass spectrometry, *Hydrogen, *Oxygen atom.

PB-170 554 **Field 7B, 20H**
CFSTI Prices: HC$4.60 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France) Centre d'Etude Nucleaires.
CONTRIBUTION AU DOSAGE de Sb-Ag-Cu-Ga-Mo-Zn PAR ACTIVATION AUX NEUTRONS DE 14 MeV (Contribution to the Determination of Sb-Ag-Cu-Ga-Mo-Zn Using 14 MeV neutron Activation),
by Michel Crambes. Apr 66, 46p CEA-R-2965
Text in French; Attached Summary in English.

Descriptors: (*Neutron activation, *Chemical analysis), (*Chemical analysis, Neutron activation), Antimony, Silver, Copper, Gallium, Molybdenum, Zinc, Beta particles, France.

By using 14 MeV neutron irradiation it is possible to extend the field of application of neutron radioactivation analysis, in particular to the case of light elements. For many other elements it can replace in-pile irradiation thereby making it possible, thanks to portable 14 MeV neutron generators, to carry out radio-activation analyses away from nuclear-research centres. Rapid chemical separation methods were developed in order to make possible the determination of several elements which, after exposure to fast neutrons, produce beta plus emitting nuclides which cannot be differentiated by a simple instrumental study, the emitted radiation being of the same type and of similar half-life. (Author)

PB-170 555 **Field 7B**
CFSTI Prices: HC$1.60 MF$0.50
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
LA DOSAGE SPECTROGRAPHIQUE DU SILICUM DANS LES ALLIAGES URANIUM-CARBONE-SILICIUM (Spectrographic Determination of Silicon in Uranium-Carbon-Silicon Alloys),
by Jean-Pierre Spitz, Jean-Jacques Chazee,Danh Tran Van, and Francois Desforges. Apr 66, 11p
CEA-R-2966, Rapport metallurgie-34-65
Text in French; Attached Summary in English.

Descriptors: (*Spectroscopy, Chemical analysis), (*Chemical analysis, Spectroscopy), (*Silicon, Chemical analysis), Uranium alloys, Silicon alloys, Carbon alloys, France.

The use of a spark excitation under a controlled argon atmosphere enables the spectrographic determination of silicon in uranium-carbon-silicon alloys. The method presented is rapid and its accuracy is most satisfactory. (Author)

PB-170 556 **Field 7B**
CFSTI Prices: HC$9.60 MF$0.75
Commissariat a l'Energie Atomique, Fontenay-Aus-Roses (France) Centre d'Etudes Nucleaires.
ETUDE DES DOSAGES D'ACIDITE LIBRE EN SOLUTION AQUEUSE (Study of Free Acidity Determinations in Aqueous Solution),
by Andre Kergreis. Apr 66, 98p CEA-R-2982
Text in French; Attached summary in English.

Descriptors: (*pH, Chemical analysis), Solutions, Water, Volumetric analysis, Colorimetric analysis, Ion exchange resins, Aluminum, Ions, Uranyl radicals, France.

In the first part, we define the various types of acidity which can exist in aqueous solution; then, after having studied some hydrolysis reactions, we compare the value of the neutralisation pH of

the hydrated cation and that of the precipitation of the hydroxide. In the second part we have started to study the determination of the acidity of an aqueous solution. After having rapidly considered the 'total' acidity determination, we deal with the problem of the 'free' acidity titration. We have considered in particular certain methods: extrapolation of the equivalent point, colorimetric titrations with or without a complexing agent, and finally the use of ion-exchange resins with mixed aqueous and solvent solutions. (Author)

AD-417 368 See Field 11B

AD-465 146 See Field 7C

AD-633 857 See Field 7C

AD-633 858 See Field 7C

NBS-TN-285 See Field 5B

7C. ORGANIC CHEMISTRY

AD-461 030 Field 7C
CFSTI Price: HC$2.60
Florida Univ., Gainesville. Dept. of Chemistry.
RESEARCH ON SYNTHESIS OF UNSATURATED FLUOROCARBON COMPOUNDS.
Semiannual rept. no. 3, 1 Apr-30 Sep 64,
by Paul Tarrant, David Sayers, Jim Heyes, Ward Oliver, andA. C. Wright. 30 Sep 64, 28p
Contract DA-19-129-AMC-79 (N)
See also AD-462 259.

Descriptors: (*Halogenated hydrocarbons, Synthesis (Chemistry)), (*Fluorine compounds, Synthesis (Chemistry)), Gringard reagents, Chemical reagents, Chemical reactions, Silanes, Metalorganic compounds, Bromine compounds, Alkenes.

The relative reactivity of various fluoroolefins in their reaction with allylmagnesium bromide was investigated. Reactions of some other allylic Grignard reagents with fluoroolefins are described. A convenient route to 1,2-difluoroolefins is provided by the alcoholysis of substituted trimethyldifluorovinyl silanes prepared by the action of organolithium reagents on trimethyltrifluorovinyl silane. The preparation of pentafluoroallyl bromide and some new fluorodiolefins is described. (Author)

AD-465 146 Field 7C, 21I, 7B
CFSTI Prices: HC$1.00 MF$0.50
Rocket Power, Inc., Pasadena, Calif.
RESEARCH ON SUBSTITUTED FLUOROCARBONS.
Final summary rept., 1 Nov 63-30 Apr 65,
by Laurence B. Marantz, and Russell Reed Jr.30 Apr 65, 14p
Contract Nonr-3597 (00)

Descriptors: (*Oxidizers, Halogenated hydrocarbons), (*Halogenated hydrocarbons, Chemical properties), (*Oxyfluorides, Chemical properties), Fluorine compounds, Methane, Synthesis (Chemistry), Explosions, oxygen compounds, Fluorides, Nitrates, Nitrogen compounds, Oxides, Nitrogen.

Identifiers: Nitrosyl fluoride, Nitroxyl fluoride, Nitryl fluoride, Trifluoromethyl hypofluorite.

A new synthesis of trifluoromethyl hypofluorite (CF3OF) was investigated. The preparation of this compound was accomplished by spark-initiated reactions between trifluoromethane and oxygen difluoride. When small amounts of nitrogen are present in explosive reactions of methane and oxygen difluoride, fluorine nitrate is produced. When oxygen difluoride is mixed with nitric oxide, equimolar mixtures of nitryl fluoride and nitrosyl fluoride are produced. A mechanism for this reaction is proposed. (Author)

AD-633 801 Field 7C
CFSTI Prices: HC$2.00 MF$0.50
Washington Univ., Seattle. Dept. of Chemistry.
COMPETITIVE UNIMOLECULAR DECOMPOSITION PROCESSES IN CHEMICALLY ACTIVATED SYSTEMS. 3-HEXYL RADICAL.
Technical rept.,
by D. C. Tardy, B. S. Rabinovitch, and C. W. Larson. 5 Jun 66, 42p TR-7
Contract Nonr-477 (36),
Proj. NR-051-217
Also includes Insertion by Triplet Methylene Radicals in Alkane Systems, by D. F. Ring and B. S. Rabinovitch.

Descriptors: (*Free radicals, Decomposition), (*Alkanes, Chemical reactions), Reaction kinetics, Molecular energy levels, Excitation, Thermochemistry, Alkenes, Heat of reaction, Chemical bonds, Vibration.

Identifiers: Butylenes, Hexenes, Pentenes, Methylene radicals.

A general formulation of the rates of competitive unimolecular reactions is given and various relationships between the rates, and between the energetics, of competing processes are described. The relative and absolute rates of decomposition, C-C-C-C.-C-C* to .CH3+C5H10-1 to .C2H5+ C4H8-1, were measured at pressures from 0.004 to 90 mm Hg for vibrationally excited 3-hexyl radicals, chemically activated by the addition of hydrogen atoms to trans-3-hexene at 300C. Use of a quantum-statistical model for k sub E in the general relations provides good theoretical agreement with the experimental data at all pressures. The results can also be used to lead to either of two alternative conclusions: that D-null (CH3-H) - D-null (C2H5-H) is 5.4 kcal/mole, or that the difference in critical energies for addition of methyl to pentene-1, Em-null, and of ethyl to butene-1, Ee-null is Em-null-Ee-null = -0.4 kcal. In the second paper, evidence is presented that triplet methylene radicals may, under certain conditions, insert into C-H bonds.

AD-633 857 Field 7C, 7B
CFSTI Prices: HC$1.00 MF$0.50
University of Western Ontario, London. Dept. of Chemistry.
METAL MERCAPTIDES. PART I. TITANIUM TETRAMERCAPTIDES AND DIALKYLAMINOTITANIUM (IV) MERCAPTIDES.
Technical rept.,
by D. C. Bradley, and P. A. Hammersley. 16 May 66, 25p TR-4
Contract Nonr-3325 (00),
Proj. NR-052-426

Descriptors: (*Metalorganic compounds, *Thiols), (*Titanium compounds, Thiols), Amides, Synthesis (Chemistry), Amines, Polymers, Complex compounds, Sulfides, Freezing point, Spectra (Infrared), Nuclear magnetic resonance, Chemistry.

Identifiers: Mercaptides, Titanium mercaptides.

Reactions of excess mercaptan R'SH (R' = Me, Et, or ISO-Pr) with titanium dialkylamides Ti (NR2)4 (R = Me or Et) gave insoluble non-volatile red titanium tetramercaptides containing strongly addended mercaptan and amine, viz. Ti (SR')4, (R'SH)x (R2NH)y. It is suggested that these compounds are polymeric due to mercaptide bridges and that 8-coordinated titanium may be involved. Soluble complexes of the type Ti (SR')4, (R2NH)x, where R' = n-Pr or n-Bune, were also obtained. Attempts to prepare titanium tetratert.-butylmercaptide gave products believed to be titanium sulphide tert.-butylmercaptides which on heating gave impure titanium sulphide. Controlled addition of ethylmercaptan or isopropylmercaptan to Ti (NR2)4 gave soluble compounds: Ti (NMe2)3SEt, Ti (NMe2)2 (SEt)2, Ti (NMe2)3Siso-Pr and Ti (NMe2)2 (Siso-Pr)2 which were shown by cryoscopic measurements to be polymeric. Infrared and n.m.r. spectra were also obtained. (Author)

AD-633 858 Field 7C, 7B
CFSTI Prices: HC$1.00 MF$0.50
University of Western Ontario, London. Dept of Chemistry.
MERCAPTIDES OF COBALT, NICKEL, COPPER AND ZINC.
Technical rept.,
by D. C. Bradley, and C. H. Marsh. 17 May 66, 6p TR-5
Contract Nonr-3325 (00)
Proj. NR-052-426

Descriptors: (*Metalorganic compounds, Thiols), (*Cobalt compounds, Thiols), (*Nickel compounds, Thiols), (*Copper compounds, Thiols), (*Zinc compounds, Thiols), Synthesis (Chemistry), Chemical properties, Polymers, Complex compounds, Canada.

Identifiers: Cobalt mercaptides, Copper mercaptides, Mercaptides, Nickel mercaptides, Zinc mercaptides.

Preparations and certain properties are reported.

AD-633 890 Field 7C
CFSTI Prices: HC$1.00 MF$0.50
Olin Mathieson Chemical Corp., New Haven, Conn.
A NEW SERIES OF ORGANOBORANES. VIII. THE REACTION OF PHOSGENE WITH THE DILITHIUM SALTS OF o- AND m-CARBORANE.
Technical rept.,
by Joseph R. Reiner, Roy P. Alexander, and Hansjuergen Schroeder. Jun 66, 7p TR-31
Contract Nonr-3395 (00),
Proj. NR-356-431
See also AD-615 819.

Descriptors: (*Organoboranes, *Heterocyclic compounds), (*Phosgene, Chemical reactions), Lithium compounds, Boranes, Ketones, Molecular structure, Spectrum (Infrared), Chlorides, Polymers.

Identifiers: B-heterocyclic compounds, Carboranes.

When phosgene was reacted with o-B10H10C2Li2 to generate, desired type of compound, the heterocycle (o-B10H10C2.CO)2 was obtained as a high melting solid (m.p. 315) in 50% yield. The carbonyl stretching frequency appeared as a single sharp band at 1720/cm. which indicates a planar ring configuration. In the analogous reaction between m-B10H10C2Li2 and phosgene, employment of a large excess of COC12 produced the diacid dichloride, m-B10H10C2 (CO.C1)2, which could be expected from this reaction but was obtained in only 20% yield. The other products isolated consisted of a pentane soluble highly viscous material and a pentane insoluble solid, both of which were found to be polymeric (with 3 and 5 repeating units). When equimolar amounts of the two reactants were allowed to interact, only traces of the diacid dichloride were isolated. However, again the polymer having five repeating units proved to be the product with the highest molecular weight.

AD-634 108 Field 7C, 7D
CFSTI Prices: HC$2.00 MF$0.50
Ohio State Univ. Research Foundation, Columbus.
MOLECULAR STRUCTURE OF CARBANIONS AND THE KINETICS OF THEIR EXCHANGE PROCESSES IN SOLUTION. THE KINETICS OF INVERSION OF 2-METHYLBUTYLMAGNESIUM BROMIDE AND RELATED COMPOUNDS.
Final rept., 1 Jan 63-30 Jun 65,
by Gideon Fraenkel, and Don T. Dix. Apr 66, 40p
Grant AF-AFOSR-251-63
Projs. AF-9762, RF-1606
Task 976203
AFOSR 66-0879

Descriptors: (*Metalorganic compounds, Reaction kinetics), Molecular structure, Exchange reactions, Solutions, Bromides, Magnesium compounds, Lithium compounds, Beryllium compounds, Aluminum compounds, Phosphines, Amides, Organic nitrogen compounds, Grignard reagents, Grignard reactions, Enthalpy, Entropy.

Identifiers: Hexamethyl phosphoramides, Tris-dimethyl-amino phosphine.

Analysis of the results of changes among n.m.r. spectra of 2-methylbutylmagnesium bromide and bis- (2-methylbutyl)-magnesium as a function of temperature in several ethers reveals that the changes are due to different rates of inversion at the CH2Mg carbon atom. In diethyl ether the kinetic order of the inversion process is 2.5 in contained Grignard reagent, and enthalpy and entropy are 12+or - kcal and -11+or -2 e.u., respectively; for the organomagnesium compound, the order is 2.0, and enthalpy and entropy are 18+or -5 kcal and 5+2 e. u. Investigation is underway on the kinetics of the carbanion inversion in organolithium, -beryllium, and-aluminum compounds. Reaction between metals and hexamethyl phosphoramide indicate that the amide is reduced to tris-dimethyl-amino phosphine. Organometallic compounds are being synthesized from certain azo compounds, including RC (=O)N=NR' and RNHNH2.

AD-634 116 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.50
Florida Univ., Gainesville. Dept of Chemistry.
RESEARCH ON SYNTHESIS OF UNSATURATED FLUOROCARBON COMPOUNDS.
Semiannual rept. no. 6, 1 Oct 65-31 Mar 66,
by Paul Tarrant, Doug Perry, Jai Tandon, Alan Wright, andSusumu Misaki. 31 Mar 66, 55p
Contract DA-19-129-AMC-79 (N)
See also AD-461 030.

Descriptors: (*Fluorine compounds, Synthesis (Chemistry)), (*Elastomers, Fluorine compounds), Alkanes, Aluminum compounds, Chlorides, Halogenated hydrocarbons, Diene synthesis, Aromatic compounds, Dienes.

Work has continued on some aluminum chloride catalyzed additions of polyhaloalkanes to haloolefins. Additional work has been done using perfluoroallyl systems. Nitrosyl chloride has been allowed to react with some fluorodienes to give a nitroso derivative in one case (but to give a suspected Diels-Alder adduct when the diene was conjugated). Free radical additions of haloalkanes to various olefins have been attempted and in some cases reactions of the products investigated. The free radical addition of haloalkanes to aromatic nuclei has been continued and terminated. Some Diels-Alder additions between cyclopentadiene and some haloolefins has been effected, and the preparation of some fluoronorbornadienes from the products has been attempted. (Author)

N66-21441 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.75
Hughes Aircraft Co., Culver City, Calif. Materials Technology Dept.
DEVELOPMENT OF IMPROVED STERILIZABLE POTTING AND ENCAPSULATING COMPOUNDS FOR SPACE APPLICATIONS.
Annual summary rept. no. 2, 1 Jul 64-30 Jun 65,
by N. Bilow. 1965, 84p P-65-88
Contract NAS8-5499
NASA CR-71523

Descriptors: *Polymer, *Potting compound, *Siloxane, *Silicone, *Urethane.

N66-21806 **Field 7C**
CFSTI Prices: HC$3.00 MF$0.75
Notre Dame Univ., Ind. Dept. of Chemistry.
THE FUNDAMENTAL STUDIES ON THE SYNTHESIS OF HEAT-RESISTANT POLYMERS.
Summary progress rept. no. 10, 15 Sep 65-31 Jan 66,
by G. F. Dalelio. 15 Feb 66, 95p
Grant NsG-334
NASA CR-71529

Descriptors: *Polymer, *Synthesis, *Azine, *Heat resistance.

N66-21822 **Field 7C**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley. Space Sciences Lab.
CONTINUOUS COUNTERCURRENT DIALYSIS OF LARGE VOLUMES,
by S. Mandeles, and E. C. Woods. 1965, 17p
Grants NsG-479, PHS-GM-12158-02
NASA CR-71550
Supported in part by Grant NsG-600.

Descriptors: *Analyzer, *Chemical analysis, *Chromatography, *Extraction, *Separator.

AD-633 528 **See Field 11J**

AD-633 742 **See Field 16O**

AD-633 969 **See Field 7E**

AD-634 039 **See Field 7B**

AD-634 046 **See Field 7B**

AD-634 107 **See Field 7D**

NBS-TN-285 **See Field 5B**

7D. PHYSICAL CHEMISTRY

AD-444 449 **Field 7D**
CFSTI Price: HC$2.60
General Dynamics/Astronautics, San Diego, Calif. Space Science Lab.
PREPARATION OF ACCURATE TEST GAS MIXTURES,
by E. R. Bartle, and E. A. Meckstroth. Jul 64, 24p
GDA-EBE64-044
Contract DA-04-495-ORD-3383 (Z), ARPA Order-393

Descriptors: (*Carbon dioxide, Mixtures), Gases, Synthesis (Chemistry), Reaction kinetics, Purification, Additives, Carbon monoxide, Oxygen, Hydrogen, Gas chromatography.

Identifiers: Defender project.

Chemical kinetic studies of CO2 formation led to the requirement of preparing accurately known, prescribed test gas mixtures. Techniques were developed for the purification of reagent grade gas components to minimize undesirable impurities, the accurate determination of the resulting mole concentrations and the ability to add very small prescribed minor constituents to a test gas mixture. Concentrations may be determined within 1% using partial pressure measurements for C > 7% and within 2% using gas chromatographic analysis for C > 50 ppm. A series of test gas mixtures of argon diluted CO, O2 and H2 were prepared and the concentrations found to be within 2% of that desired. (Author)

AD-450 678 **Field 7D, 20M**
CFSTI Price: HC$1.60
Union Carbide Research Inst., Tarrytown, N. Y.
MASS SPECTROMETRIC STUDY OF ZIRCONIUM DIBORIDE.
Technical rept.,
by O. C. Trulson, and H. W. Goldstein. Oct 64, 15p UCRI-2787-TR-C-25
Contract DA-30-069-ORD-2787

Descriptors: (*Zirconium compounds, Borides), (*Borides, Mass spectrum), (*Mass spectroscopy, Zirconium compounds), Vapors, Vapor pressure, Heat of vaporization, Zirconium, Boron, Heat of formation, Thermochemistry.

Identifiers: Zirconium dicarbide.

A mass spectrometer was used with a high temperature Knudsen effusion source to obtain vapor pressure data for zirconium diboride in the temperature range 2267 to 2445K. The heat of vaporization at 298K determined from a Third Law analysis of the data is 474.5 plus or minus 5.3 kcal/mole. Vapor pressure data for zirconium and boron were also obtained: The Third-Law heats of vaporization at 298K are 141.8 plus or minus 3.3 kcal/mole, for zirconium, and 130.3 plus or minus 3.3 kcal/mole, for boron. The corresponding heat of formation of zirconium diboride at 298K is -72.1 kcal/mole. Separate vapor-pressure measurements made on ZrB2 mixed with C in a graphite crucible at 298K gave the result -74.5 kcal/mole. (Author)

AD-633-470 **Field 7D, 11I**
CFSTI Prices: HC$3.00 MF$0.75
Picatinny Arsenal, Dover, N. J. Plastics and Packaging Lab.
DILUTE SOLUTION PROPERTIES OF HIGH-MOLECULAR-WEIGHT POLY (ISOBUTYL METHACRYLATE). VII. EFFECT OF CENTRIFUGING ON VARIOUS PARAMETERS.
Technical rept.,
by Eleanor C. Schramm, and Richard J. Valles.
Jun 66, 68p TR-3305
Proj. DA-1C522301A060
See also AD-434 893.

Descriptors: (*Acrylic resins, Solutions), (*Molecular weight, Acrylic resins), (*Viscosity, Acrylic resins), Organic solvents, Acetones, Butanones, Centrifugal fields, Light, Scattering, Molecular structure, Osmosis.

Identifiers: Poly (isobutyl methacrylates).

Three samples of high-molecular-weight poly (isobuyl methacrylate), designated 937,SW63/0082 and SW62/0298, were all found to be shear dependent. Sample SW62/0298, which has the highest molecular weight, readily dissolved in acetone and methyl ethyl ketone. Both its weight average molecular weight and its intrinsic viscosity decreased as the centrifuging time increased. The number average molecular weight, determined by light scattering, seemed to remain constant. Sample SW63/0082, with the next highest molecular weight, did not readily dissolve in acetone and methyl ethyl ketone. but again, the weight average molecular weight and the intrinsic viscosity decreased with centrifuging time, while the number average molecular weight remained constant. Sample 937 behaved somewhat differently. First, the intrinsic viscosity decreased slightly as the centrifuging time increased, but levelled off at three hours. The weight average molecular weight stayed constant for three hours, but dropped slightly after four hours. The number average molecular weight remained constant. Author)

AD-633 619 **Field 7D, 21B, 7E, 20I K**
CFSTI Prices: HC$3.00 MF$0.50
Louvain Univ. (Belgium). Lab. of Inorganic Chemistry.
CHEMI-IONIZATION PROCESSES.
Annual summary scientific rept. no. 1,
by A. Van Tiggelen, and S. De Jaegere. May 66, 58p
Grant AF-EOAR-82-65
ARL 66-0099

Descriptors: (*Photochemistry, Ionization), (*Flames, *Gas Ionization), Ions, Reaction kinetics, Samplers, Mass spectroscopy, Spectrum analyzers, Electromagnetic lenses, Flash lamps, Photolysis, Concentration (Chemistry), Chemical reactions, Belgium.

The characteristics of isentropic expansion indicate that sampling orifices used for the extraction of ions from a flame burning at atmospheric pressure should be kept as small as possible if kinetics

of ion reactions are to be investigated. The lens support of the mass spectrometer extraction chamber was modified and a Mecker burner will be used instead of the classic Bartholome-profile burner. The vibrating reed electrometer was replaced by a more sensitive instrument with faster response. A description is given of the construction of a new flashphotolysis apparatus, applied to the measurement of chemi-ionization reactions. A discussion is given of the requirements for the flash equipment. A conductimetric method for the measurement of the absolute value of the ion concentration is proposed. The possibility of isolating the different chemi-ionization reactions possible in flames through the flashconductimetric method is discussed. (Author)

AD-633 655 **Field 7D, 7E**
CFSTI Prices: HC$1.00 MF$0.50
Nottingham Univ. (England). Dept. of Chemistry.
THE KINETICS OF INTERFACIAL TRANSFERS.
Final rept.,
by D. G. Tuck. 1966, 25p
Grant AF-EOAR-62-53,
Proj. AF-7023
ARL 66-0098

Descriptors: (*Phase studies, Diffusion), (*Diffusion, Tracer studies), (*Mercury, Diffusion), (*Iodine, Diffusion), Radioactive isotopes, Dynamics, Surfaces, Solutions, Potassium compounds, Iodides, Carbon tetrachloride, Sulfuric acid, Alkanes, Great Britain.

The diffusion coefficient across the boundary between Hg203 and inactive Hg as a function of temperature increased from 1.55 plus or minus 0.01 at 23C to 1.96 plus or minus 1 at 60.1C. For iodine, using I131 tracer, in aqueous KI, and CC14, the diffusion coefficient was 0.875 plus or minus. 0.005. For iodine between 0.08 MKI in 0.001 M H2SO4 and heptane 34.6 plus or minus 0.3 was found for the diffusion coefficient. Iodine flows across the interface without any slow transfer process being involved whether from the organic to the aqueous phase or from the aqueous to the organic phase. The studies were performed using a 1 mm bore by 30 to 40 cm long vertically mounted borosilicate tube, and thermostated. Movement of the radioactive species was determined by scanning the length of the tube by scintillation counting. (Author)

AD-633 665 **Field 7D, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
CALCULATING THE THERMODYNAMIC FUNCTIONS OF GASEOUS URANIUM, PLUTONIUM AND THEIR IONS UP TO 20,000K,
by L. V. Gurvich, and V. S. Yugman. 20 Jan 66, 14p FTD-TT-65-1480
Unedited rough draft trans. of Simpozium po Termodinamike s Osobym Uporom na Yadernye Materialy i Perenos Atomov v Tverdykh Telakh, Vienna, 22-27 Jul 1965 12p.

Descriptors: (*Thermodynamics, *Uranium), (*Plutonium, Thermodynamics), Gases, Ions, Functions, Tables, USSR.

AD-633 729 **Field 7D, 7E, 18D**
CFSTI Prices: HC$4.00 MF$1.00
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
EXPERIMENTAL DETERMINATION OF THE ROLE OF SOLVENT-SOLVENT ENERGY MIGRATION IN SCINTILLATOR SOLUTIONS AND THE LIFETIME OF THE TRIPLET STATE OF LIQUID BENZENE.
Master's thesis,
by James Warren Van Loben Sels. Mar 66, 133p
GSP/PH/66-20

Descriptors: (*Scintillation counters, Liquids), (*Solvents, *Luminescence), (*Benzene, Molecular energy levels), Toluenes, Xylenes, Excitation, Energy, Quenching (Inhibition), Transport properties, Diffusion, Phosphorescence, Spectrophotometers.

Identifiers: Biacetyl.

Experimental quenching constants were obtained by the spectrophotofluorometric method in aerated and degassed solutions, using benzene, toluene, and p-xylene as donors, and using biacetyl as the acceptor. From the quenching constants and the known mean lifetimes of the excited donor states, experimental values for the energy transfer rate constants were determined. It was found that in the undiluted solvent systems, the solvent-solvent energy migration occurred at a rate comparable to that of the material diffusion, and that this rate decreased linearly with solvent dilution. The order of magnitude of the triplet state lifetime of liquid benzene was determined by measurements of the phosphorescence to fluorescence ratio for biacetyl in degassed benzene solution. Comparison of the value for this ratio determined for direct acceptor excitation with the value found for the benzene sensitized acceptor excitation, resulted in the detection of the benzene triplet state and the calculation of its approximate lifetime. This lifetime was found to be of the order of 10 to the -8th power seconds. (Author)

AD-633 732 **Field 7D, 7E**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
VERIFICATION OF THE SMOLUCHOWSKI EQUATION FOR VISCOUS SOLVENTS.
Master's thesis,
by James Hendrix Gorrell Jr. Mar 66, 115p SP/PH/66-07

Descriptors: (*Fluorescence, Energy), (*Solvents, Viscosity), (*Viscosity, Equations), Transport properties, Reaction kinetics, Alkanes, Quenching (Inhibition), Polycyclic compounds, Naphthalenes, Phenanthrenes, Diffusion.

Identifiers: Chrysenes, Hexadecanes.

The experimental data needed to verify the applicability of the Smoluchowski equation in the calculation of the rate constant for donor to acceptor electronic energy transfer in n-hexadecane was obtained. This data was the quenching constant, the mean lifetime of the donor's excited state and the diffusion coefficients for donor and acceptor molecules in n-hexadecane. From the data obtained for three of the systems investigated, it was found that the Smoluchowski equation is a valid method for the calculation of the rate constant. For example, the experimental values of the rate constants for naphthalene, phenanthrene and chrysene were 12.1, 9.5 and 18.1 x 10 to the 9th power liter/mole/second as compared with the values 11.0, 12.5 and 16.7 x 10 to the 9th power liter/mole/second as calculated by means of the Smoluchowski equation. The values of the rate constants predicted by the Debye and Porter modifications of the Smoluchowski equation were 2.4 and 3.6 x 10 to the 9th power liter/mole/second, respectively. (Author)

AD-633 830 **Field 7D, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
SEPARATION OF VANADIUM FROM CRUDE OILS AND PETROLEUM PRODUCTS BY MEANS OF AQUEOUS SULFONIC ACID SOLUTIONS,
by A. V. Kotova and S. V. Emelyanova. 1966, 6p Translation-2180
TT 66-61426
Udalenie Vanadiya iz Neftei i Nefteproduktov Vodnymi Rastvorami Sulfokislot, trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) n10 p29-31 1965.

Descriptors: (*Vanadium, Solvent extraction), Sulfonates, Toluenes, Benzoic acids, Petroleum, Solutions, USSR, Metallurgy.

Identifiers: Toluene sulfonic acid, Sulfanilic acid, Sulfonobenzoic acid.

The possibility of removing vanadium from crude oils and petroleum products by means of aqueous solutions of n-toluenesulfonic acid, o-sulfonobenzoic acid and sulfanilic acid was demonstrated. It is easier to extract vanadium from crude oils and petroleum products which do not contain a vanadium-porphyrine complex. (Author)

AD-634 008 **Field 7D, 14B**
CFSTI Prices: HC$5.00 MF$1.00
Dayton Univ., Ohio. Research Inst.
ALLISON METHOD OF CHEMICAL ANALYSIS.
Final technical rept., Apr-Dec 65,
by Herbert F. Mildrum, and Bernhard M. Schmidt. May 66, 188p UDRI-TR-106
Contract AF 33 (657)-9175,
Proj. AF-8119
AFAPL TR-66-52

Descriptors: (*Chemical analysis, Instrumentation), (*Magneto-optic effect, Chemical analysis), Test equipment, Electrical properties, Radiofrequency spectroscopy, Circuits, Theory, Coils, Electromagnetic pulses, Calibration.

Identifiers: Allison effect.

The report describes the theoretical study and experimental circuit investigations conducted on the Allison effect apparatus used for chemical analysis. The inherent electrical behavior of an Allison effect apparatus was well defined by using modern high speed oscillographic techniques and frequency selective equipment. A continuous radio frequency spectrum characterized by numerous resonances rapidly diminishes into the noise level at 4000 megahertz. A theoretical analysis of the apparatus generated a valid equivalent circuit model. A review of the extensive data indicates that the Allison effect apparatus functions primarily as a phase comparator for radio frequencies in the 30 to 100 megahertz range. An rf-optical interaction in the cells, possibly by means of the Cotton-Mouton effect, is thought to produce a characteristic light modulation effect when phase matching occurs. (Author)

AD-634 016 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
Rochester Univ., N. Y.
UNIMOLECULAR DECOMPOSITION OF CYCLOBUTANE DERIVATIVES AT HIGH PRESSURE.
Final scientific rept.,
by D. J. Wilson, and W. D. Walters. 1966, 9p
Grant AF-AFOSR-575-64
AFOSR 66-0931

Descriptors: (*Cyclobutanes, Decomposition), Nitrogen, Reaction kinetics, High-pressure research.

Rate-constant-versus-pressure diagrams were obtained for decomposition of ethylcyclobutane diluted with nitrogen at pressure ranges from 305 to 1940 lb/sq in and at 410 plus or minus or -0.1 C. Anomalous behavior of the rate constant was observed, decreasing slightly with increasing pressure. The anomalous effect is explained in terms of transition state theory where the normal reactant molecules are assumed to be in equilibrium with activated molecules. The volume of activation is calculated to be 35 ml/mole.

AD-634 107 **Field 7D, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania Univ., Philadelphia. Dept. of Chemistry.
SOLVENT ISOTOPE EFFECTS FOR CH3OH vs. CD3OH.
Final rept. Jun 63-May 66,
by Edward R. Thornton. May 66, 9p

Grant AF-AFOSR-431-63
Proj. AF-9762
Task 976203
AFOSR 66-0915

Descriptors: (*Halogenated hydrocarbons, Chemical analysis), Methanols, Deuterated compounds, Halides, Isotopes, Solvents, Gas chromatography, Mass spectroscopy, Ions.

Identifiers: Solvolysis, Isotope effect.

A precise (hopefully approaching plus or minus 0.1%) method of determining solvent isotope effects for competitive methanolysis reactions of alkyl halides (and other compounds) in mixtures of methanol (CH_3OH) and methan-d3-ol (CD_3OH) is being developed. The method utilizes gas chromatographic separation of very small amounts of reaction product followed by mass spectrometric analysis of the isotopic ratios in the product. Careful control experiments are necessary to insure accuracy and high precision. The results are expected to provide detailed information about the activation process for solvolysis reactions. (Author)

ANL-6985 **Field 7D, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
A CONVECTIVE-DIFFUSION STUDY OF THE DISSOLUTION KINETICS OF 304 STAINLESS STELL IN THE BISMUTH-TIN EUTECTIC ALLOY,
by T. F. Kassner. Nov 65, 39p
Contract W-31-109-eng-38

Descriptors: (*Liquid metals, Reaction kinetics), (*Eutectics, Corrosion).

DP-1021 **Field 7D, 18J**
CFSTI Prices: HC$2.00 MF$0.50
Du Pont De Nemours (E. I.) and Co., Aiken, S. C. Savannah River Lab.
ELECTROWINNING PLUTONIUM METAL,
by J. A. Porter, and A. E. Symonds Jr. Feb 66, 22p
Contract AT (07-2)-1

Descriptors: (*Liquid metals, Plutonium), (*Plutonium, Electrostatic precipitation).

Identifiers: Electrowinning

NBS-MP-278 **Field 7D**
CFSTI Prices: HC$0.55 MF$0.75
National Bureau of Standards, Washington, D.C. Inst. for Basic Standards.
BIBLIOGRAPHY ON ATOMIC TRANSITION PROBABILITIES.
Miscellaneous publication,
by B. M. Glennon, and W. L. Wiese. 22 Apr 66, 105p
Monograph 50, superseded. Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.55.

Descriptors: (*Atomic energy levels, Electron transitions), (*Electron transitions, Probability), Bibliographies, Selection rules.

A revised and updated bibliography on atomic transition probabilities is presented. The papers are arranged according to elements and stages of ionization, and the method employed and class of transitions are indicated behind each reference. Only articles on discrete transitions, both permitted and forbidden, are listed. Also included is a supplementary list of important papers dealing with transition probabilities from a general point of view, and a table of comprehensive papers not included in the element list. (Author)

NBS-TN-332 **Field 7D, 4A**
CFSTI Prices: HC$0.60 MF$0.75
Environmental Science Services Administration, Boulder, Colo. Inst. for Telecommunication Sciences and Aeronomy.
CARBON DIOXIDE SPECTRAL LINE POSITIONS AND INTENSITIES CALCULATED FOR THE 2.05 AND 2.7 MICRON REGIONS,
by Robert F. Calfee, and William S. Benedict. 15 Mar 66, 114p
ARPA Order-250-61
Availability: Original document in color until exhausted. Prepared in cooperation with National Bureau of Standards, Washington, D. C. Inst. for Basic Standards. Hardcopy available from the Superintendent of Documents, GPO, Washington, D. C., 20402, $0.60.

Descriptors: (*Carbon dioxide, Band spectrum), (*Infrared spectroscopy, Carbon dioxide), Line spectrum, Intensity, Tables, Absorption spectrum.

The spectral line positions and intensities for the carbon dioxide bands occurring in the 2.05 and 2.7 micron regions of the infrared spectrum are listed. Lines with intensities down to 10 to the -7th power cm/atm cm are listed for a temperature of 296K. (Author)

N66-21770 **Field 7D**
CFSTI Prices: HC$2.00 MF$0.50
Minnesota Univ., Minneapolis. Dept. of Chemical Engineering.
LAW OF CORRESPONDING STATE FOR THE TRANSPORT PROPERTIES OF MOLTEN SALTS,
by H. T. Davis, and K. D. Luks. 1965, 39p
Grant NGR-24-005-063
NASA CR-71387

Descriptors: *Alkali, *Fusion, *Salt, *Transport property.

N66-21820 **Field 7D**
CFSTI Prices: HC$3.00 MF$0.75
Pennsylvania Univ., Philadelphia. Electro-Chemistry Lab.
STUDIES IN FUNDAMENTAL CHEMISTRY OF FUEL CELL REACTIONS.
Quarterly progress rept., 1 Oct-31 Dec 65,
by J. O. Bockris. 1965, 80p Rept. no. 7
Grant NsG-325
NASA CR-71548

Descriptors: *Chemical reaction, *Electrochemistry, *Fuel cell.

N66-22203 **Field 7D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
MINIMIZATION OF ERRORS IN SHOCK TUBE INVESTIGATION OF BROMINE DISSOCIATION RATES IN PRESENCE OF NOBLE GASES,
by M. Warshay. 1965, 14p NASA-TM-X-56448

Descriptors: *Shock tunnel, *Bromine, *Dissociation.

AD-464 733 **See Field 20L**

AD-633 645 **See Field 20L**

AD-633 681 **See Field 21B**

AD-633 686 **See Field 10B**

AD-633 725 **See Field 11F**

AD-633 764 **See Field 20B**

AD-633 837 **See Field 20H**

AD-633 886 **See Field 11F**

AD-633 951 **See Field 20J**

AD-634 046 **See Field 7B**

AD-634 061 **See Field 20L**

AD-634 108 **See Field 7C**

ANL-6894 **See Field 14B**

PB-170 549 **See Field 20B**

7E. RADIO AND RADIATION CHEMISTRY

AD-633 554 **Field 7E, 20E, 20F**
CFSTI Prices: HC$3.00 MF$0.75
Bausch and Lomb, Inc., Rochester, N. Y. Research and Development Div.
LASER DAMAGE STUDY OF THIN FILMS.
Final technical rept. 1 Apr 65-1 Apr 66,
by A. F. Turner, J. Becker, and W. F. Coombs. 1 Apr 65, 82p
Contract Nonr-4717 (00), ARPA Order-306

Descriptors: (*Lasers, *Photochemistry), (*Dielectric films, Photochemistry), Films, Optical coatings, Damage, Light, Optics.

Damage to optical surfaces and materials is often experienced in high intensity laser beams. The threshold values above which this damage occurs are of interest for both optical engineering and theoretical purposes. In the present work energy density thresholds were determined for single quarterwave and halfwave films vacuum evaporated on glass and quartz substrates. Using a 6 microsec. ruby laser pulse films of the following dielectric materials were studied: ThF4, MgF2, Al2O3, 5NaF.3AlF3, SiO2, ZrO2, TiO2, CeO2 and ZnS. Aluminum and Inconel films were also included. The latter were found to have thresholds around .05 joules/sq cm, whereas thresholds for the dielectrics covered the range from 50 down to 0.5 joules/sq cm, roughly in the sequence of the preceding listing.

AD-633 969 **Field 7E, 7C**
CFSTI Prices: HC$2.00 MF$0.50
Brandeis Univ., Waltham, Mass.
PHOTOCHEMISTRY OF AZO COMPOUND AND STUDIES IN UNIMOLECULAR REACTIONS.
Final scientific rept. 1 Jan 64-31 Dec 65,
by Colin Steel. 31 Dec 65, 34p
Grant AF-AFOSR-583-64
See also AD-632 738

Descriptors: (*Organic nitrogen compounds, *Photochemistry), (*N-heterocyclic compounds, Chemical reactions), Photolysis, Polycyclic compounds, Gycloalkenes, Dienes, Molecular isomerism, Excitation, Absorption spectrum, Carbon dioxide, Fluorescence.

Identifiers: Diaza bicycloheptenes.

PHOTOCHEMICAL PRODUCTION OF 'HOT' MOLECULES: Pressure dependence investigation during photolysis of 2,3-diazabicyclo (2,2,1)-2-heptene (DBH) showed that although the incident radiation may be monochromatic, the mechanism of dissociation is such as to result in energy dispersion with the result that the vibrationally hot molecules produced are by no means monoenergetic. PRIMARY PROCESSES IN THE PHOTOCHEMISTRY OF CYCLIC AZO COMPOUNDS: Fluorescence emission was observed in both DBH and 2,3-diazabicyclo (2.2.2)-2-octene (DBO). The gas-phase spectra for DBH showed that the excitation spectrum closely parallels the absorption spectrum and that emission spectrum is a good qualitative mirror of the latter. DBO spectra were similar to those of DBH but the clear mirror image relationship observed for DBH was lost. ENERGY TRANSFER: Various substances, including CO_2 are being studied in regarding their efficiency as energy transfer agents in the gas phase photolysis of DBH into vibrationally excited compounds. (Author)

NYO-2978-44 **Field 7E**
CFSTI Prices: HC$3.00 MF$0.50
Consolidation Coal Co., Library, Pa. Research Div.

BETA RADIATION-INDUCED TELOMERIZATION OF METHANOL WITH ETHYLENE.
Final rept., 1 Nov 64-30 Apr 65,
by P. M. Yavorsky, N. J. Mazzocco, and E. Gorin.
10 Sep 65, 54p
Contract AT (30-1)-2978

Descriptors: (*Alcohols, Chemical reactions), (*Strontium, Radioactive isotopes).

PB-169 880 **Field 7E, 18G**
CFSTI Prices: HC$2.60 MF$0.50
Institutt for Atomenergi, Kjeller (Norway).
ANALYSIS OF THE CHEMICAL STATE OF PLUTONIUM AND FISSION PRODUCTS IN PROCESS FEED SOLUTIONS,
by M. Bonnevie-Svendsen, and V. Martini. Feb 66, 21p KR-81

Descriptors: (*Reactor fuel processing, Plutonium), (*Plutonium, Valence), (*Fission products, Solvent extraction), Chemical analysis, Chromatographic analysis, Photochemistry, Reduction (Chemistry), Uranyl radicals, Nitrates, Ruthenium, Zirconium, Niobium, Norway.

The chemical states of plutonium and fission products in reprocessing feed solutions are discussed and the need for simple routine analytical procedures for the characterization of species with different extractability is stressed. The development of an extraction chromatographic procedure for the determination of Pu (III), Pu (VI), and Pu (IV) is described. The main source of error was a light-induced reduction of Pu, which occurred in the presence of excess uranyl nitrate. Performed under exclusion of light, the method is well suited for the sensitive determination of Pu (III) and Pu (VI) in feed solutions. Less than a microgram of Pu is required, and macroconcentrations of U and technical impurities do not interfere. A fractionation of ruthenium species according to their TBP - extractability can be obtained in the same operation. The possibility for applying a similar procedure to zirconium and niobium is discussed. (Author)

PB-169 882 **Field 7E, 18G, 18H**
CFSTI Prices: HC$6.60 MF$0.75
Institutt for Atomenergi, Kjeller (Norway).
RADIOCHEMICAL AND NUCLEAR STUDIES OF THE SHORT-LIVED FISSION PRODUCTS 145Ce, 146Ce, AND 147Ce,
by D. C. Hoffman, and O. B. Michelsen. Dec 65, 66p KR-76

Descriptors: (*Fission products, Radiochemistry), (*Cerium, Radiochemistry), (*Praseodymium, Radiochemistry), Solvent extraction, Phosphoric acids, Chromatographic analysis, Radioactive decay, Gamma-ray spectroscopy, Beta-ray spectroscopy, Coincidence counting, Half life, Decay schemes, Gamma emission, Beta decay.

Identifiers: Di (ethylhexyl) orthophosphoric acids.

A procedure based on extraction by di- (2-ethylhexyl) orthophosphoric acid (HDEHP) was prepared for the rapid separation of cerium from fission products and also - through extraction chromatography - for the continuous separation of praseodymium activities from their parent activities. The latter procedure allows observation of radiocerium with a minimum of interference from its daughters. The decay properties of the short-lived cerium isotopes 145Ce, 146Ce, and 147Ce have been studied by gamma and beta scintillation spectrometry and by gamma-gamma, gamma-beta, and beta-gamma coincidence measurements. Information was obtained as regards half-lives, gamma and beta ray energies, and relative intensities of gamma rays. Decay schemes are proposed for 146Ce and 145Ce, though only a partial one for the latter nuclide. The decay of 147Ce was observed directly for the first time, and its half-life was determined by both gamma and beta decay measurements. However, attempts to single out specific gamma or beta energies for this nuclide failed. A search for a possible 146mPr gave no definite results. (Author)

AD-633 619 **See Field 7D**

AD-633 655 **See Field 7D**

AD-633 729 **See Field 7D**

AD-633 732 **See Field 7D**

AD-633 816 **See Field 11E**

AD-633 875 **See Field 18H**

AD-633 885 **See Field 18E**

PB-169 984 **See Field 6H**

8A. BIOLOGICAL OCEANOGRAPHY

AD-633 532 **Field 8A, 6M**
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Biology.
REACTIONS WITH MANGANESE BY BACTERIA FROM MARINE FERROMANGANESE NODULES,
by H. L. Ehrlich. 1966, 8p
Contract Nonr-591 (22),
Proj. NR-103655

Descriptors: (*Marine biology, Manganese), (*Bacteria, Marine biology), Culture media, Enzymes, Sea water, Peptones, Mercury compounds, Chlorides, Ions, Iron compounds, Electrolytes (Physiology), Oxidation-reduction reactions.

Previous reports by the author revealed an intimate association of several bacterial species with manganese nodules from the Atlantic Ocean. It was demonstrated by selective enrichment and with pure-culture isolates that some of the bacteria from nodules can accelerate accretion of dissolved manganese to nodules, and others can promote release of manganese from these concretions. Both processes occur under aerobic conditions. Recent work strongly indicates that the bacterial contribution in manganese-accretion to and manganese-release from nodules is enzymatic action on manganese. In manganese-accretion, bacteria react with manganous manganese, after it has first been adsorbed to nodule surfaces. This is inferred because in 3-hour experiments, moe NPM antipode could conceivably be more precise than in other antipodal areas. An analysis of the data obtained in July 1963 by the Naval Research Laboratory via aircraft flights in the vicinity of the antipode of radio station NPM, Hawaii (19.8-kHz transmitter) is presented. Definite evidence of convergence of field strengths was found, as expected; a peak value of 2.0 mv/m for the field was measured during the experiment. Indications of in inverse square root dependence on distance for the field strength were observed. The expected diurnal pattern of highest field strengths at local sunrise, lowest fields at local sunset, and intermediate fields at local noon and midnight was found to be true. (Author)

AD-633 578 **Field 8A, 8C, 8J, 5A K**
CFSTI Prices: HC$4.00 MF$0.75
Interagency Committee on Oceanography, Washington, D. C.
NATIONAL OCEANOGRAPHIC PROGRAM, FISCAL YEAR 1967,
Mar 66, 112p ICO-Pamph-24

Descriptors: (*Oceanology, *Research program administration), Federal budgets, United States Government, Oceanographic vessels, Oceanographic equipment, Manpower studies, Training, Marine engineering, Scientific research.

The National Oceanographic Program for Fiscal Year 1967 represents the plans of nine Federal departments and agencies, coordinated through ICO panels on Research, Surveys, Ocean Engineering, International Programs, Ships, Instrumentation and Facilities, and Manpower and Training. This program document is designed to inform the executive branch, the Congress, and the scientific and industrial communities of those efforts and resources needed in FY 1967 to advance this nation's exploration and exploitation of the ocean. (Author)

AD-633 735 **Field 8A**
CFSTI Prices: HC$1.00 MF$0.50
Smithsonian Institution, Washington, D. C.
INDIAN OCEAN MEDUSAE.
Final rept., 15 Jan 64-10 Feb 66,
by I. E. Wallen, and Marta Vannucci. 10 Feb 66, 3p
Contract Nonr-4382 (00),
Proj. NR-104-805
Prepared in cooperation with Sao Paulo Oceanographic Inst. (Brazil).

Descriptors: (*Indian Ocean, *Aquatic animals), (*Marine biology, Indian Ocean), Tables.

Identifiers: Medusae, Coelenterates.

AD-634 041 **Field 8A**
CFSTI Prices: HC$1.00 MF$0.50
Naval Oceanographic Office, Washington, D. C. Oceanographic Surveys Dept.
A STUDY OF THE MARINE FOULING AND BORING ORGANISMS AT ADMIRALTY INLET, WASHINGTON.
Informal manuscript rept.,
by John A. Depalma. May 66, 25p NO-O-6-66

Descriptors: (*Marine borers, Washington (State)), Marine biology, Fouling, Test facilities, Test methods, Data, Collecting methods, Water pollution, Algae, Larvae, Barnacles, Mollusca, Protozoa, Aquatic animals.

Identifiers: Bryozoa, Polychaeta, Coelenterates, Hydrozoa, Urochordata.

In June 1963, NAVOCEANO initiated a fouling study at Admiralty Inlet, Washington, a site representative of the southern portion of the cold temperate Aleutian province. This report describes the test site, outlines the technique of data collection and analysis, and discusses the results of the first two years of this program. (Author)

PB-170 315 **See Field 5C**

8B. CARTOGRAPHY

AD-633 610 **Field 8B, 17I, 8E**
CFSTI Prices: HC$3.00 MF$0.75
Army Engineer Geodesy Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va.
TEST AND EVALUATION OF THE PROTOTYPE SIDE-LOOKING RADAR RESTITUTOR.
Technical rept. May 62-Nov 63,
by Clifford J. Crandall. Apr 66, 59p Rept. no. 29-TR
Proj. DA-4A623501D853,
Task 4A623501D85310

Descriptors: (*Side-looking radar, *Mapping), Geodesics, Data processing systems, Optical instruments, Radar images, Distortion, Corrections, Experimental design.

Identifiers: Restitutors (Radar).

This report covers the testing and evaluation of the prototype Side-Looking Radar Restitutor to determine its capability to correct for distortions caused by slant range, including earth curvature, systematic errors, sweep delay, tracking of the

flight line, and line-of-flight deviations and presents data on the accuracy of the instrument. The report concludes that: (a) The prototype instrument does not meet the accuracy requirements specified in the contract; however, conclusive tests could not be conducted. (b) This instrument is definitely not an operational item. (c) The electronics are reliable. (d) The design can be improved in many places. These have been noted in the event of future development. With these improvements it may be possible that restitution can be accomplished within the prescribed horizontal accuracy requirements for 1:250,000-scale planimetric maps. (Author)

N66-21649 **Field 8B**
CFSTI Prices: HC$4.00 MF$0.75
McGill Univ., Montreal (Quebec).
ATLAS OF INTERPRETED PHOTOGRAPHY OF SOUTHERN AFRICA FROM TIROS SATELLITES I TO VIII,
by J. B. Bird, A. Morrison, and M. Lundgren.
Nov 65, 119p
Contract NASR-140
NASA CR-71391

Descriptors: *Africa, *Earth surface, *Photograph interpretation, *Tiros satellite.

8C. DYNAMIC OCEANOGRAPHY

AD-633 829 **Field 8C**
CFSTI Prices: HC$1.10 MF$0.50
Department of the Navy, Washington, D. C.
MEASUREMENT OF BOTTOM CURRENTS IN THE BLACK SEA WITH A NEUTRALLY BUOYANT ULTRASONIC BUOY,
by Yu. G. Ryzhkov, and I. I. Karnaushenko.
1966, 5p Translation-2091
TT 66-61425
Izmerenie Glubinnykh Techenii v Cherom More s Pomoshchyu Ultrazvukovoi Vekhi Neitralnoi Plavuchesti, Trans. of Akademiya Nauk SSSR. Doklady, v141 n1 p74-6 1961.

Descriptors: (*Ocean currents, *Black Sea), (*Oceanographic equipment, USSR), Spar buoys, Ultrasonic radiation, Flow meters, Specifications, Marine engineering.

AD-634 119 **Field 8C, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Navy Underwater Sound Lab., New London, Conn.
A STUDY OF SHALLOW WATER WIND DRIFT CURRENTS AT TWO STATIONS OFF THE EAST COAST OF THE UNITED STATES,
by Harold J. Doebler. 13 May 66, 87p USL-755
Projs. SR-104-03-01, S12-101-1321
Tasks 0587, 11215

Descriptors: (*Ocean currents, *Wind), Oceanology, Seacoast, Fluid mechanics.

Ekman published his classical paper on wind drift currents in 1902, in which both the deflecting force of the earth's rotation and the eddy viscosity were taken into account. Pure drift currents in deep water far from land were predicted to move forty-five degrees to the right of the wind in the Northern Hemisphere (and to the left in the Southern Hemisphere). This study compares the results of analyses of a year of hourly observations at two stations off the east coast of the United Sates to an extension of Ekman's model to shallow nearshore areas. The observational data comprise over 12,000 paired hourly wind and surface current vectors, which are presented here in various ways, to illustrate the variability and permit comparisons. The drift currents at the two lightships were clearly found to move to the right of the wind, but by an amount significantly less than 45 degrees predicted by Ekman's pure drift current theory. Additionally, the findings included these points: (1) the median drift angles for the lightship data were found to fall between zero and ten degrees to the right of the wind; (2) the serial drift angles formed a distribution about the median approximating that of Gaussian form; (3) half of all serial drift angles were within about + or - 30 degrees of the median drift angle; (4) the measurement technique is sufficiently sensitive to clearly show the dependence of the drift current on winds of velocities as low as one and two miles per hour; (5) the current force was found to increase approximately one cm/sec for each 100 cm/sec increase in wind force without support of critical wind speed; (6) the drift angles resulting from off-shore winds are further to the right than those for on-shore winds; and (7) drift angles for the strongest winds are slightly smaller than those for moderate winds. The usefulness of a shallow water drift current model, which may suggest possible reasons for some of the findings, is discussed. (Author)

AD-633 578 **See Field 8A**

8E. GEODESY

AD-633 863 **Field 8E, 22C, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Autometric Facility. Raytheon Co., Alexandria, Va.
MODES OF SATELLITE TRIANGULATION ADJUSTMENT. VOLUME I.
Final technical rept., 23 Sep 65-20 Apr 66,
by Michael W. Creusen, and Soren W. Henriksen.
Apr 66, 40p Rept. no. 163
Contract DA-44-009-AMC-1327 (X),
Proj. DA-4A013001A91D

Descriptors: (*Astronomical geodesics, *Satellites (Artificial), (*Programming (Computers), Astronomical geodesics), Satellite tracking systems.

Identifiers: Triangulation.

This report describes the development of a computer program that will perform a satellite-triangulation adjustment, using the direction numbers of the straight lines in space that connect the different camera stations. The program computes the approximate values of the coordinates of all camera stations. These coordinates are used to form the proper observation equations for a least squares adjustment, yielding the adjusted coordinates and their variance matrix. This report consists of two parts: The general program description and a collection of descriptions of the subroutines used. It is concluded that the work has been performed according to the contract. It is concluded further that other recent work in this area may merit investigation. (Author)

AD-633 864 **Field 8E, 22C, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Raytheon Co., Alexandria, Va. Autometric Operation.
MODES OF SATELLITE TRIANGULATION ADJUSTMENT. VOLUME II. PROGRAM DOCUMENTATIONS,
by Michael W. Creusen, and Soren W. Henriksen.
Apr 66, 87p Rept. no. 163
Contract DA-44-009-AMC-1327 (X)

Descriptors: (*Astronomical geodesics, *Satellites (Artificial)), (*Programming (Computers), Astronomical geodesics), Corrections.

Identifiers: Triangulation.

AD-416 596 **See Field 22C**

AD-633 610 **See Field 8B**

8F. GEOGRAPHY

AD-634 096 **Field 8F, 6F**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Meteorology.
SOILS OF THE BOREAL FOREST: A PRELIMINARY REPT.
Technical rept.,
by James A. Larsen. Mar 66, 50p TR-25
Contract Nonr-1202 (07),
Proj. NR-387-022

Descriptors: (*Soils, Canada), (*Ecology, Canada), Climatology, Plants (Botany), Geochemistry, Geography, Arctic regions.

Identifiers: Boreal forest.

Basic soil types and the soil-forming processes at work in the boreal forest zone of Canada are described employing as sources the publications existing in this field. Included are descriptions of the great soil groups found in the region, their differences, similarities, and genetic relationships; a general description of the chemistry of the podzolization processes; a review of the more abundant rock types from which the parent materials of the soils in the various areas are derived. Nutritional and ecological relationships of plants making up the vegetative cover on various soil types are described briefly. Included are original data from analyses of soil samples obtained during ecological and bioclimatological studies of the vegetation in areas of Ontario, Manitoba, Wisconsin, Minnesota, and Keewatin, conducted by the author. (Author)

AD-634 097 **Field 8F, 6F, 4B**
CFSTI Prices: HC$2.00 MF$0.50
Wisconsin Univ., Madison. Dept. of Meteorology.
RELATIONSHIPS OF CENTRAL CANADIAN BOREAL PLANT COMMUNITIES: STUDIES IN SUBARCTIC AND ARCTIC BIOCLIMATOLOGY, II.
Technical rept.,
by James A. Larsen. Apr 66, 40p TR-26
Contract Nonr-1202 (07)
Proj. NR-387-022

Descriptors: (*Plants (Bontany), Canada), (*Ecology, *Climatology), Geography, Arctic regions.

Identifiers: Boreal forest.

Four major vegetational communities in the region encompassing western Ontario, Manitoba, Saskatchewan, southern Keewatin, Minnesota and Wisconsin were sampled (where available) for the purpose of determining whether regional vegetational community relationships are correlated with regional climatic relationships. Climatic or climatically related environmental influences are of sufficient magnitude to result in discernable correlations with community differences using the techniques employed in this study, despite the recognized variability in statistical control of the nonclimatic variables. Pertinent community relationships are revealed and the species and species groups contributing most importantly to these relationships are identified. The possibilities of achieving meaningful correlations between community differences and specific climatic parameters are discussed with a view to future work. (Author)

AD-633 987 **See Field 2B**

AD-634 069 **See Field 13B**

AD-634 095 **See Field 4B**

PB-169 705 **See Field 5C**

PB-169 710 **See Field 5C**

PB-169 711 **See Field 5C**

PB-169 712 **See Field 5C**

PB-169 713 **See Field 5C**

PB-169 717 **See Field 5C**

PB-169 722 **See Field 5C**

PB-169 732 **See Field 5C**

PB-169 736 **See Field 5C**

PB-169 741 See Field 5C

PB-169 944 See Field 5C

PB-169 945 See Field 5C

PB-170 039 See Field 5C

PB-170 043 See Field 5C

PB-170 051 See Field 5C

PB-170 053 See Field 5C

PB-170 111 See Field 5C

PB-170 218 See Field 5C

PB-170 220 See Field 5C

PB-170 228 See Field 5C

PB-170 229 See Field 5C

PB-170 236 See Field 5C

PB-170 239 See Field 5C

PB-170 241 See Field 5C

PB-170 242 See Field 5C

PB-170 243 See Field 5C

PB-170 244 See Field 5C

PB-170 245 See Field 5C

PB-170 247 See Field 5C

PB-170 248 See Field 5C

PB-170 252 See Field 5C

PB-170 253 See Field 5C

PB-170 263 See Field 5C

PB-170 264 See Field 5C

PB-170 265 See Field 5C

PB-170 271 See Field 5C

PB-170 272 See Field 5C

PB-170 277 See Field 5C

PB-170 283 See Field 5C

PB-170 286 See Field 5C

PB-170 288 See Field 5C

PB-170 290 See Field 5C

PB-170 291 See Field 5C

PB-170 307 See Field 5C

PB-170 308 See Field 5C

PB-170 315 See Field 5C

PB-170 317 See Field 5C

PB-170 322 See Field 5C

PB-170 323 See Field 5C

PB-170 324 See Field 5C

PB-170 325 See Field 5C

PB-170 326 See Field 5C

PB-170 329 See Field 5C

PB-170 330 See Field 5C

PB-170 331 See Field 5C

PB-170 333 See Field 5C

PB-170 334 See Field 5C

PB-170 336 See Field 5C

PB-170 342 See Field 5C

PB-170 343 See Field 5C

PB-170 361 See Field 13C

PB-170 509 See Field 5C

PB-170 568 See Field 5C

PB-170 599-1 See Field 5C

PB-170 599-2 See Field 5C

8G. GEOLOGY AND MINEROLOGY

AD-633 710 **Field 8G, 20B, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Yale Univ., New Haven, Conn. Kline Geology Lab.
THERMALLY ACTIVATED PROCESSES IN THE EARTH: CREEP AND SEISMIC ATTENUATION.
Technical rept.,
by R. B. Gordon. Mar 66, 26p TR-2
Contract Nonr-609 (54),
Proj. RR-007-01-01

Descriptors: (*Crystallography, *Geophysics), Lithosphere, Creep, Elasticity, Plasticity, Crystal lattice defects, Thermodynamics, Seismology, Solid state physics, Petrology.

Non-elastic behavior of crystalline material results from the thermally activated motion of crystal imperfections; perfect crystals are perfectly elastic. The mobility of crystal defects is determined by an activation energy, an activation volume, and an activation entropy, which to a good approximation are independent of temperature and pressure. Consequently the mobility of a crystal imperfection depends on depth in the earth in a characteristic way, increasing rapidly at first due to the steep thermal gradient near the surface and then decreasing due to the effect of pressure. Thermally activated movement of imperfections controls diffusion, phase transformation kinetics, high temperature creep, recrystallization and the damping of elastic waves in solid mantle material. Diffusion creep, in which the motion of dislocations is not required, results from the diffusion of atoms in a stress gradient and produces viscous flow at geologically significant rates in a polycrystalline solid. The viscosity of the mantle resulting from diffusion creep passes through a minimum and is strongly depth dependent. A characteristic depth dependence of the damping of elastic waves is also found but the viscosity cannot be deduced from the observed internal friction. (Author)

N66-21584 **Field 8G**
CFSTI Prices: HC$5.00 MF$1.00
Geological Survey, Washington, D. C.
ASTROGEOLOGIC STUDIES. PART B. CRATER INVESTIGATIONS.
Annual progress rept., 1 Jul 64-1 Jul 65,
by H. G. Wilshire. Oct 65, 184p
NASA Order-R-66
NASA CR-71420

Descriptors: *Impact damage, *Lunar crust, *Crater, *Volcanics.

N66-21664 **Field 8G**
CFSTI Prices: HC$1.00 MF$0.50
Geological Survey, Washington, D. C.
REFLECTANCE MEASUREMENTS IN THE 0.6 TO 2.5 MICRON PART OF THE SPECTRUM,
by W. A. Fischer, and R. Gerharz. 1 Feb 66, 17p
NASA-Order-R-146
NASA CR-71407

Descriptors: *Mineral, *Absorption band, *Electromagnetic absorption, *Rock.

N66-22177 **Field 8G**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE CHEMICAL COMPOSITION AND ORIGIN OF MOLDAVITES,
by J. A. Philpotts, W. H. Pinson, and W. H. Pinson Jr. 1965, 35p NASA-TM-X-56666
Prepared in cooperation with Massachusetts Inst. of Tech., Cambridge.

Descriptors: *Metal oxide, *Chemical composition, *Moldavite, *Tektite.

AD-633 874 See Field 18C

AD-633 940 See Field 14E

PB-170 361 See Field 13C

PB-170 509 See Field 5C

8I. MINING ENGINEERING

PB-169 741 See Field 5C

8J. PHYSICAL OCEANOGRAPHY

AD-633 602 **Field 8J, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Houston Univ., Tex. Dept. of Electrical Engineering.
STATISTICAL DESCRIPTION OF OCEAN SURFACE,
by H. S. Hayre. 1966, 6p
Contract Nonr-4492 (02)

Descriptors: (*Statistical analysis, *Oceanographic data), Surfaces, Ocean waves, Stochastic processes.

Oceanographers have characterized the random ocean surface by its frequency spectrum, which, at best, includes both the crosswind and downwind spectra. Others working in the field of radar or underwater acoustic scatter fields have established that the probability density function of the ocean surface heights is normal. It is believed that cross-correlation between the fast varying and slowly varying components of the sea surface in both downwind and crosswind directions or a generalized covariance function are essential in order to understand the surface reflection characteristics. A literature search shows that this area of surface definition has not been explored although numerous attempts have been made to utilize the wave spectra, sea state, and or wind velocity to empirically relate the return signal and the return. (Author)

AD-633 612 **Field 8J, 20D**
CFSTI Prices: HC$3.00 MF$0.75
New York Univ., N. Y. Geophysical Sciences Lab.
ON THE GROWTH OF THE SPECTRUM OF A WIND GENERATED SEA ACCORDING TO A MODIFIED MILES-PHILLIPS MECHANISM.
Technical rept.,
by Tokujiro Inoue. Apr 66, 71p TR-66-6
Contract N62306-1589

Descriptors: (*Ocean waves, Mathematical prediction), Wind, Water waves, Hydrodynamics, Mathematical models, Linear systems, Differential equations.

A linear differential equation for the change of spectral density can be expressed by d/dt S

(omega; u,x,y,t)=A(omega, u(t,x,y))+B(omega, u (t,x,y)) S (omega; u,x,y,t) where S (omega; u,x,y,t) is the spectrum, and the terms A (omega, u (t,x,y)) and B (omega, u (t,x,y)), can be considered to be due to the Phillips type of resonance and the Miles surface instability growth theory, respectively. To determine these functions, the spectra computed from wave records obtained by the British weather ships, 'Weather Reporter' and 'Weather Explorer' were used. Also, to make up for the lack of a full range of those data, results obtained in the field study of Snyder and Cox were used. The spectral growth equation was then extended by an appropriate assumption for energy dissipation. The derived spectral growth agrees with the growth of waves obtained by Sverdrup and Munk in the wave height sense, and the spectra grow in roughly the way postulated by Neumann. The results of this study show that about 30 hours are required to reach 90% of the fully developed significant wave height for a 40 knot wind measured at 19.5 m. Also about 600 nautical miles are needed for 90% full development for a 40 knot wind velocity at 19.5 m. The family of partially developed sea spectra is shown for wind velocities from 20 knots to 45 knots in 5-knot increments for both the duration limited and fetch limited conditions. (Author)

AD-633 635 **Field 8J, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
DERIVATION OF A GENERALIZED FUNCTION OF THE WAVE HEIGHT DISTRIBUTION ON THE SURFACE OF A HEAVY LIQUID,
by I. S. Brovikov. 26 Apr 66, 16p TG-230-T472
Contract NOw-62-0604-c
Trans. of Gosudarstvennyi Okeanograficheskii Institut. Trudy (USSR) n42 p105-14 1958.

Descriptors: (*Ocean waves, Measurement), Wind, Water waves, Surface area, Height finding, Statistical data, Statistical analysis, Oceanology, Fluid mechanics.

The author discusses the adequacy of visual, semi-instrumental, and instrumental methods for observing wind wave elements. This is followed by an examination of the statistical characteristics of the height and period deep sea waves obtained by instrumental observations and of the statistical characteristics of wind-induced waves obtained theoretically. (Author)

AD-633 637 **Field 8J**
CFSTI Prices: HC$2.60 MF$0.50
Department of the Navy, Washington, D. C.
ON THE RELATION BETWEEN SALINITY, CHLORINITY, AND DENSITY OF THE WATER OF THE SEA OF AZOV,
by A. P. Tsurikova. 1966, 27p Translation-2187 TT 66-61392
O Zavisimosti Mezhdu Solenostyu, Khlornostyu i Plotnostyu vod Azovskogo Morya, trans. of Gosudarstvennyi Okeanograficheskii Institut. Trudy (USSR) v52 p28-48 1960.

Descriptors: (*Seas, USSR), (*Oceanology, USSR), Oceanographic data, Correlation techniques, Sea water.

Identifiers: Azov Sea.

AD-633 578 **See Field 8A**

AD-633 841 **See Field 8M**

AD-633 899 **See Field 8L**

8K. SEISMOLOGY

AD-433 611 **Field 8K**
CFSTI Price: HC$4.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE REPRESENTATION OF SEISMIC WAVES IN FREQUENCY-WAVE NUMBER SPACE,
by E. J. Kelly Jr. 6 Mar 64, 43p Group rept. GR-1964-15
Contract AF 19 (628)-500
ESD TDR-64-38

Descriptors: (*Seismic waves, Mathematical models), Mechanical waves, Sound signals, Signal-to-noise ratio, Propagation, Green's function, Functions, Velocity, Seismology.

In seismic discrimination problems one is interested in filtering out information carried in certain waves from noise carried in other waves. With the use of arrays of sensors, this filtering can be performed in space and time. It is quite useful to visualize the filtering in the Fourier-conjugate space of wave number and frequency, and this point of view is developed. Most of the report is devoted to an expression of the pertinent facts about the propagation of elastic waves in the earth in terms of the frequency-wave number diagram. The remainder concerns signal and noise models and the interpretation of filtering techniques in frequency-wave number space. (Author)

AD-633 475 **Field 8K, 17J**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Technical Applications Center, Washington, D. C.
LONG RANGE SEISMIC DATA FROM THE LAKE SUPERIOR SEISMIC EXPERIMENT 1963-1964.
Technical rept.,
by Robert H. Mansfield, and Jack F. Evernden.31 Mar 66, 42p VU-66-1
Rept. on Proj. VELA-UNIFORM.

Descriptors: (*Seismology, *Underwater explosions), Great Lakes, Geophysical prospecting, Explosive materials, Explosions, Seismic waves, Propagation, Earthquakes, Nuclear explosions, Detection, Identification systems.

Identifiers: Vela-Uniform.

As part of a planned subcrustal experiment, three series of chemical explosions, ranging in size from 1/8 ton to 10 tons, were detonated on the bottom of Lake Superior during July 1963 and July and October 1964. Although these explosions were intended primarily for stations deployed at fairly close distances, many of them were detected at distances of approximately 500 to 2500 kilometers during routine daily recording operations at a number of mobile Long Range Seismic Measurements van stations, at five experimental seismic observatories, and at several scattered deep-well installations, all operated as part of a VELA-UNIFORM research program under the technical direction of the Air Force Technical Applications Center. This report summarizes the types of data recorded, presents typical measurements, and discusses some of the resulting conclusions. Travel times of Pn and P, S, Lg, and some unidentified emergent phases were measured. Residuals of Pn and P with reference to a constant velocity of 8.1 kilometers per second are compared with results from the Nevada Test Site and from the GNOME event in New Mexico, confirming a regional difference between eastern and western Pn velocities. Time residuals are also considered in relation to crustal structure under Lake Superior. (Author)

AD-633 657 **Field 8K, 20A**
CFSTI Prices: HC$3.00 MF$0.75
Electrical Engineering Research Lab., Univ. of Tex., Austin.
PROPAGATION OF ELASTIC WAVES IN LAYERED MEDIA.
Technical rept.,
by Allan B. Schmitt, and Frances X. Bostick Jr. 15 May 66, 97p Rept. no. 142
Contract Nonr-375 (17),
Proj. NR-081-253

Descriptors: (*Mechanical waves, Propagation), (*Seismology, *Acoustics), Stresses, Strain (Mechanics), Wave functions, Equations of motion.

The fundamental stress-strain relationships are established and the necessary simplifying assumptions are introduced such as homogeneity, isotropy, etc. The equation of motion is derived and the elastic wave equations derived in terms of a displacement potential. The boundary conditions are established and example models are used to illustrate the distribution of energy associated with each type of wave. The ray path equations for horizontal and dipping layers are derived. It is shown how the nth layer parameters of wave velocity, layer depth, and dip of interface may be estimated if these parameters are known for the 1st, 2nd, . . . , n-1st layers and the arrival times of a seismic wave reflected from the nth interface. The method is applied to actual seismic data obtained from Texas Instruments. (Author)

AD-633 877 **Field 8K**
CFSTI Prices: HC$2.00 MF$0.50
Arctic Inst. of North America, Montreal (Quebec).
MICROSEISMIC NOISE ON CANADIAN SEISMOGRAPH RECORDS IN 1962 AND STATION CAPABILITIES.
Research paper,
by P. W. Basham, and K. Whitham. May 66, 36p RP-36
Grant AF-AFOSR-62-453, ARPA Order-292-62
Pub. in Publications of the Dominion Observatory v32 n4.

Descriptors: (*Microseisms, Canada), (*Seismology, Canada), Seismological stations, Seismographs, Seismic waves, Earthquakes, Data.

Measurements of short- and long-period microseisms from the eight first-order Canadian seismic stations in operation during 1962 are presented. Monthly mean values of specific hour and daily maximum short- and long-period amplitudes vary considerably from station to station and season to season. Cumulative frequency plots and amplitude probability levels of specific hour and daily maximum short-period microseismic amplitudes are presented. Long-period microseismic periods and spectral peak positions are seen to vary from summer to winter. Curves are presented illustrating the 90 per cent and 50 per cent probability levels of unified magnitude perceptibility for epicentral distances up to 110 degrees, and the 90 per cent probability level of local earthquake magnitude perceptibility for epicentral distances up to 20 degrees. These curves are used to explain an easily demonstrated station variability in teleseism reporting, and used to assess the theoretical coverage of Canadian seismicity in 1962. (Author)

8L. SNOW, ICE, AND PERMAFROST

AD-633 489 **Field 8L, 20M**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
AN ANALYTICAL INVESTIGATION OF A MODIFIED STEFAN PROBLEM.
Research rept.,
by Yin-Chao Yen, and Chi Tien. Mar 66, 22p RR-185
Proj. DA-1V014501B52A02

Descriptors: (*Ice, Phase studies), (*Thermodynamics, Ice), Thermal radiation, Thermal conductivity, Melting, Heat transfer, Numerical analysis.

Identifiers: Stefan problem.

Approximate solutions of temperature distribution and melting rate of ice were obtained for the case where the mode of heat transfer is natural convection due to the thermal instability caused by the heated lower surface. Extensive numerical solutions were obtained for the ice-water system corresponding to various thermal conditions in terms

of parameters defined as R sub delta T = (T sub s - T sub m)/ (T sub m - T 0) and phi = L/C sub p (T sub m - T 0), where T sub s is the temperature of the heat source, T sub m is melting point of ice, T sub 0 is the initial temperature of ice, L is the latent heat of fusion, and C sub p is heat capacity of ice. (Author)

AD-633 539 **Field 8L, 4A, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Cold Regions Research and Engineering Lab., Hanover, N. H.
LIGHT SCATTERING AND PARTICLE AGGREGATION IN SNOWSTORMS.
Research rept.,
by Malcolm Mellor. Feb 66, 23p RR-193
Task DA-1V025001A13001

Descriptors: (*Snow, Light transmission), (*Sky brightness, Snow), Particle size, Atmospheric refraction, Light, Solar radiation, Visibility.

Attenuation of visible radiation by falling snow was studied by a method based on brightness contrast between topographic features and the adjacent sky. Extinction coefficient and visual range are related to snow density, and are compared with data for Antarctic blizzards. Since attenuation depends more on the size and concentration of discrete particles than on the mass density of suspended snow, the process of particle aggregation and snowflake formation during fall is considered by collision theory, and an expression describing aggregation effects is developed. This offers an explanation for the relative constancy of particle concentration observed at ground level during snowfalls of varying intensity. Since there is no strong justification for relating extinction coefficient to snow density, an empirical correlation between extinction coefficient and precipitation rate is given for practical use. It is shown that visual ange estimated by eye in hilly terrain may be less than the true value, since sky brightness is locally reduced over broad hilltops with low albedo. (Author)

AD-633 617 **Field 8L**
CFSTI Prices: HC$1.00 MF$0.50
Koerner (Roy M.), London (England).
GLACIOLOGICAL STUDY ON DEVON ISLAND,
by R. M. Koerner. May 66, 13p
Contract DA-19-129-AMC-642 (N)

Descriptors: (*Glaciers, Arctic ocean islands), Ice islands, Arctic regions, Scientific research, Instrumentation.

Identifiers: Devon Island.

AD-633 899 **Field 8L, 8J, 4B**
CFSTI Price: MF$0.50
Naval Oceanographic Office, Washington, D. C. Oceanographic Prediction Div.
LONG-RANGE ICE OUTLOOK EASTERN ARCTIC (1966).
Special Pub.
May 66, 27p
NOO:DC SP-60 (66)

Descriptors: (*Ice, Arctic regions), (*Climatology, Arctic regions), (*Oceanology, Arctic regions), Sea water, Freezing, Melting, Ice islands, Glaciers, Crystal growth, Mathematical prediction.

An analysis of oceanographic and climatic data for forecasting the ice growth during the winter 1965-66 and the climatic outlook for the 1966 Arctic shipping season are included. Results of a preliminary survey of sea-ice conditions in the Labrador Sea, Davis Strait, Denmark Strait, and Baffin Bay are presented. A series of charts shows monthly prognostic sea-ice conditions from mid-May through mid-August 1966. Opening dates and harbor freezing information are included. (Author)

PB-169 608 **See Field 4B**

8M. SOIL MECHANICS

AD-633 740 **Field 8M, 13B, 13M**
CFSTI Price: MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
TWO-DIMENSIONAL ANALYSIS OF STRESS AND STRAIN IN SOILS, REPORT NO. 2. DEVELOPMENT OF PLASTIC ZONE BENEATH A FOOTING.
Research rept.,
by Robert V. Whitman, and Kaare Hoeg. Dec 65, 49p R65-61, Soils Pub-187
Contract DA-22-079-eng-427
AEWES CR-3-129
See also AD-632 354.

Descriptors: (*Soil mechanics, *Plasticity), (*Foundations (Structures), Soil mechanics), (*Civil engineering, Soil mechanics), Strain (Mechanics), Stresses, Elasticity, Mathematical analysis.

An earlier report by Whitman (AD-608 874) analyzed the need for more adequate computational procedures than presently in use for problems in soil engineering. Whitman studied the potential usefulness of plasticity theory for this purpose and suggested the application of a lumped parameter model developed by Ang and Harper (1964) to calculate the distribution of stresses and strains within soil masses. This report presents a continuation of Whitman's studies and had as its main objectives: (1) to examine the performance and accuracy of the computational model; and (2) then proceed to analyze the development of the plastic zone beneath a strip footing resting on an elastic-perfectly plastic foundation material. The report concludes that the use of the simple discrete model is a promising approach, and similar techniques will be applied during a continuation of this research program. The computed results for the flexible and rigid strip footings analyzed in this study, showed the gradual development of the plastic zone, the corresponding displacement fields, and the accumulation of footing settlements as the full shearing resistance of the foundation material was mobilized. The load-settlement curves approached asymptotically the bearing capacity which was in agreement with the ultimate load predicted by plasticity theory. (Author)

AD-633 802 **Field 8M, 18C, 13B**
CFSTI Price: MF$0.75
Kondner Research, Deerfield, Ill.
A RHEOLOGIC INVESTIGATION OF THE DYNAMIC RESPONSE SPECTRA OF COHESIVE SOILS.
Contract rept. (Summary),
by R. L. Kondner. Nov 65, 105p
Contract DA-22-079-eng-434
AEWES CR-3-148

Descriptors: (*Soil mechanics, Explosion effects), (*Rheology, Soil mechanics), Soils, Compressive properties, Nuclear explosions, Blast, Loading (Mechanics), Civil engineering.

Theoretical and experimental studies of the stress-strain-time-strength response of cohesive soils in unconfined compression under blast pulse, creep, and vibratory loadings covering wide ranges of variables are presented in terms of unified viscoelastic response spectra through the use of a nondimensional parameter denoted as the soil compliance (a reciprocal form of strain dependent, nondimensional soil modulus). Nonlinearity of the response is handled through the use of a hyperbolic stress-strain relation. The time spectrum covered by such response spectra varies from less than one millisecond to more than 1 x 10,000 minutes -- a range of over nine decades of time corresponding to loading conditions involving the very small times associated with characteristic time parameters of nuclear blast loading to the long time creep type of loadings associated with the static weight of protective construction systems. Moisture contents range from approximately 18 per cent to 41 per cent and include the range of soil consistencies and strengths (0.3 kg. per sq. cm. to more than 15 kg. per sq. cm.) generally encountered in field applications. Applied stress levels vary from approximately 0.7 per cent of the soil strength all the way to failure. Strain levels investigated range from 0.0003 per cent to more than 22 per cent and consideration is given to elastic and plastic strains. Various aspects of wave propagation are presented in terms of the response spectra. (Author)

AD-633 841 **Field 8M, 8J, 4B**
CFSTI Prices: HC$4.00 MF$0.75
Hydraulic Engineering Lab. Univ. of California, Berkeley.
A FUNCTION FOR SAND MOVEMENT BY WIND.
Technical rept.,
by A. A. Kadib. Jan 65, 103p HEL-2-12
Contract DA-49-055-CIVENG-63-4

Descriptors: (*Sand, Erosion), (*Wind, *Erosion), (*Soil mechanics, Erosion), Transport properties, Sedimentation, Fluid flow, Air, Water, Hydrodynamics, Beaches, Seacoast.

A method for calculating the rate of transport was developed. This method was based on experience gained in the field of sediment motion in rivers and all available field and wind tunnel data on the subject. It has been found that the basic forces causing the sediment motion are those of the average lift L and the fluctuating part L caused by the turbulence. Another factor contributing to the motion in the case of wind is the effect of impact, caused by the particle in saltation, in disturbing the bed surface. The effect of impact was found to be a function of the main forces causing the motion and therefore it was introduced as a correction for the mean lift force caused by the distortion of the fluid field around the bed particles. It has been found that the basic principles governing the rate of sediment transport by water and air are the same. The only difference was found to be the effect of saltation on disturbing the bed surface in the case of air. The results of this study are represented as a theoretical relation between the flow intensity and the intensity of sediment load. The effect of particle hidding in the laminar sub-layer was combined with the impact correction to give a final wind correction which proved to be a function of the parameter discribing the ratio between the submerged weight of the particle and the mean lift force. The method is applicable for calculating the rate of sand transport under a wide range of wind velocities and for sand sizes ranging from a 0.145 mm to 1.00 mm. Application of the derived method for calculating sand transport by wind from natural beaches is given. (Author)

AD-633 887 **Field 8M, 14B**
CFSTI Prices: HC$3.00 MF$0.75
IIT Research Inst., Chicago, Ill.
SOIL STRAIN GAGE INSTRUMENTATION.
Final technical rept., May 64-May 65,
by W. B. Truesdale, and R. B. Schwab. Apr 66, 97p
Contract AF 29 (601)-6410,
Projs. AF-5710, IITR-M6082
AFWL TR-65-207

Descriptors: (*Soil mechanics, *Strain gages), Soils, Strain (Mechanics), Measurement, Coils, Inductance, Circuits, Wiring diagrams.

Soil strain gage instrumentation was developed for the measurement of static and dynamic strains when embedded in soil. The gage is suitable for both laboratory and field application. The strain sensor consists of two mechanically uncoupled flat-coil disks which are embedded in the soil in near parallel and concentric orientation. The remainder of the gage comprises an identical set of coils positioned external to the soil as a standard reference, specially designed electronic driving, ampligying, and recording circuitry, and a precision micrometer coil mount. Soil deformations are

determined by the resulting change in spacing of the embedded coil disks sensed as changes in mutual coil inductance. The gage is a reliable precise measuring device which is well suited for the measurement of strain in soil. (Author)

AD-634 043 **Field 8M, 14B**
CFSTI Prices: HC$5.00 MF$1.00
Princeton Univ., N. J. Dept. of Civil Engineering.
THE DETERMINATION OF SOIL PROPERTIES IN SITU BY AN IMPACT PENETROMETER.
Engineering Research Series,
by Werner E. Schmid. Jan 66, 197p Scientific-1, Princeton Soil ERS-3
Contract AF 19(628)-2427
Proj. AF-7628
Task 76280
AFCRL 66-43

Descriptors: (*Soil mechanics, Instrumentation), Impact shock, Penetration, Samplers, Soils.

Identifiers: Impacj penetrometer.

This report presents parts of the scientific investigations carried out under a task program related to the determination and assessment of surface dynamic soil properties by laboratory instrumentation. It first reviews the historical development of the hardness-penetrometer concept and presents a pilot model for a new aerial penetrometer. Basic theoretical considerations are then advanced regarding the stress-strain relationships in axial symmetry and the dynamic loads associated with a drop-impact penetrometer. The existing theory of elasticity solutions are then reviewed and the solutions for a sphere impacting on an ideally plastic and on an elasto-plastic semi-infinite solid are presented. The Hertz solution of an elastic sphere impacting on an elastic half-space is modified by using the elastic-viscoelastic analogy to find a solution for a sphere dropping onto a four parameter viscoelastic half-space. The problem of energy transfer during impact by vibrations is discussed shortly. The data for fifteen test series carried out with the pilot model penetrometer on natural soils and on some artificial materials are presented and evaluated. It is concluded that the principle of the drop impact-penetrometer is applicable in experiments for assessing the mechanical properties of a natural soil surface. (Author)

8N. TERRESTRIAL MAGNETISM

AD-633 604 **Field 8N, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A MATHEMATICAL APPROXIMATION TO THE GEOMAGNETIC FIELD.
Master's thesis,
by Robert Earl Wiley. Mar 66, 101p GSP/PH/66-22

Descriptors: (*Terrestrial magnetism, Mathematical models), Magnetic fields, Special functions (Mathematical), Least squares method.

Identifiers: Theses.

An attempt was made to form a mathematical model for calculating the geomagnetic field using fewer terms than presently used in spherical harmonic expansion models. The model was to be made up of pairs of magnetic monopoles. It was found that at least four pairs of monopoles would be needed to produce a satisfactory model. The initial data used for fitting the four pair of monopoles was the geomagnetic field as calculated by a spherical harmonic expansion using the Jensen and Cain coefficients. Emphasis was given to fitting the South Atlantic Anomaly. The root-mean-square error for this region was 1.3 x 10 to the -2 gauss while the overall root-mean-square error was 3.4 x 10 to the -2 gauss. Comparison of the errors of the monopole model with the errors of the Jensen and Cain coefficients indicates that the root-mean-square error for the monopole model is larger than that of the Jensen and Cain coefficients. Additionally, it was found that the monopole model calculations were only 1/3 faster than the spherical harmonic expansion instead of the desired 1/2 or more reduction in calculation time. (Author)

AD-633 896 **Field 8N, 17F**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
A NUCLEAR PRECESSION MAGNETOMETER WITH COMBINED PROCESSES OF POLARIZATION AND METERING,
by A. I. Filatov, A. P. Stepanov, and V. M. Stotskii. 1966, 10p Translation-2070
TT 66-61432
Pribory i Tekhnika Eksperimenta (USSR) n1 p169-73 1965.

Descriptors: (*Terrestrial magnetism, Measurement), (*Magnetometers, Design), Potassium compounds, Sulfonates, Nuclei, Precession, Protons, Polarization, Magnetic fields, Meters, Circuits, USSR.

Identifiers: Potassium nitrosodisulfonate.

The article describes a method of measuring the earths magnetic field; the method is based on a free nuclear precession which takes place during a continuous dynamic polarization of protons of an aqueous solution of potassium nitrodisulfonate K2 (NO (SO3)2). The precession of the nuclear magnetization begins after the latter has rotated by an angle of approx. pi/2 in relation to the field to be measured; this rotation can be effected by a sharp impulse from an auxiliary magnetic field. Given are experimental results obtained by a study on a laboratory model which provided two readings per second. (Author)

N66-21650 **Field 8N**
CFSTI Prices: HC$2.00 MF$0.50
California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
VARIATIONS OF THE EARTH'S GRAVITATIONAL FIELD FROM CAMERA TRACKING OF SATELLITES,
by W. M. Kaula. 1966, 27p PUB-487
Contract NSR-05-007-060
NASA CR-71392

Descriptors: *Gravitational field, *Ground station, *Satellite photography, *Orbital element, *Photographic tracking, *Tesseral harmonics.

9. ELECTRONICS AND ELECTRICAL ENGINEERING

AD-278 675 **Field 9**
CFSTI Price: HC$5.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
HIGH POWER TUBE PROGRAM.
Semiannual technical summary rept.
30 Jun 62, 53p
Contract AF 19(604)-7400, ARPA Order-85

Descriptors: (*Microwave amplifiers, Electron tubes), (*Electron tubes, Microwave amplifiers), Klystrons, Beam power tubes, Radar duplexers, Analysis.

9A. COMPONENTS

AD-282 070 **Field 9A**
CFSTI Price: HC$1.60
Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A MILLIMETER LOW NOISE TRAVELING-WAVE AMPLIFIER.
Quarterly rept. no. 5, 1 Dec 61-28 Feb 62,
by E. W. Kinaman. 15 Mar 62, 18p
Contract DA-36-039-sc-87384,
Proj. DA-3G19-03-001-04
See also AD-271 054.

Descriptors: (*Traveling-wave tubes, Design), (*Microwave amplifiers, Design), Noise (Radio), Cathodes (Electron tubes), Electron tube heaters, Electromagnets, Tests, Millimeter waves.

Cathode-heater burnouts, cathode-to-anode leakage, and wedge breakage problems were resolved. It was originally proposed to seek means of reducing the mass of the cathode-heater as the solution for cathode-heater burnouts; a newly designed cathode-heater support structure utilizing two concentric thin-metal cones completely eliminated the problem. Operating temperature goal of 1200 C was successfully reached through use of the new support. Required heater power of the original support configuration was approximately 10 watts. The double heat shield support requires 4.5 watts. A longitudinal field straightener built for the electromagnet shows promise of improving focusing field straightness to the degree required. (Author)

AD-284 536 **Field 9A**
CFSTI Price: HC$1.60
Watkins-Johnson Co., Palo Alto, Calif.
DEVELOPMENT OF A MILLIMETER LOW-NOISE TRAVELING-WAVE AMPLIFIER.
Quarterly rept. no. 6, 1 Mar-31 May 62,
by E. W. Kinaman. 15 Jun 62, 14p
Contract DA-36-039-sc-87384,
Proj. DA-3G19-03-001-04
See also AD-282 070.

Descriptors: (*Traveling-wave tubes, Design), (*Microwave amplifiers, Design), Noise (Radio), Cathodes (Electron tubes), Electron guns, Electron beams, Focusing, Radiofrequency power, Waveguide windows, Waveguides, Millimeter waves.

Efforts continued on the development of a millimeter low-noise traveling-wave tube amplifier. The test solenoid arrived and was used to evaluate tube no. 3. The tests were successful in that they showed excellent beam focusing through the helix to the collector. The required current was obtained from the face of the .002-in cathode. A 40 decibel electronic gain was observed for the traveling-wave tube amplification at wavelengths in the 3-mm region. (Author)

AD-297 528 **Field 9A, 13H**
CFSTI Price: HC$4.60
General Electric Co., Syracuse, N. Y. Heavy Military Electronics Dept.
SOLDERABILITY OF PRINTED CIRCUITS.
Quarterly progress rept. no. 1, 1 Sep-31 Dec 62.
31 Dec 62, 43p
Contract DA-36-039-AMC-00008,
Task 703

Descriptors: (*Printed circuits, Soldering), Soldering alloys, Temperature, Reliability, Tin alloys.

AD-407 624 **Field 9A, 12A**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A SIMPLE METHOD FOR DESIGNING AN ELLIPTICAL POLARIZER IN SQUARE WAVEGUIDE,
by Alan H. Kessler, and William J. Getsinger.28 May 63, 16p 46G-3
Contract AF 19(628)-500

Descriptors: (*Waveguides, Phase shifters), Electric fields, Electromagnetic waves, Velocity, Calculus of variations, Geometry, Geometric forms, Cavity resonators, Polarization.

This paper shows a procedure that was used to find the differential phase shift between the two orthogonal modes that synthesize an elliptically polarized wave in a modified square waveguide by deriving simple algebraic expressions for the

cut-off wavelengths of the two modes. The results achieved indicate that the approximations caused less than 1.5% error over the applicable range of interest. (Author)

AD-414 451 **Field 9A, 20C**
CFSTI Price: HC$2.60
Stanford Research Inst., Menlo Park, Calif.
DIELECTRIC THIN FILMS WITH INCREASED BREAKDOWN STRENGTH.
Technical rept. no. 4, 1 Dec 62-31 May 63,
by Saul W. Chaikin, and Gilbert St. John. 30 Jun 63, 28p
Contract DA-36-039-sc-87460,
Proj. SIR-PMU-3693

Descriptors: (*Capacitors, Dielectric films), (*Dielectric films, Thorium compounds), Fluorides, Manufacturing methods, Test methods, Electrical properties, Life expectancy, Dielectric properties, Dielectrics, Capacitance, Tests, Cleaning, Test equipment (Electronics), Voltage.

Film capacitors made with vacuum-deposited thorium fluoride exhibited an average dielectric breakdown strength of 7.3 volts/1000 A in dielectric thicknesses ranging from 480 to 4335 A. Leakage current near breakdown ranged from less than 2 microamps to 5 microamps. Variations in dissipation factor (0.036 to 0.28) correlated with the ThF4 evaporation source type and with substrate temperature: radiant heating of the source produced the lowest, and elevated substrate temperature the highest, dissipation factor. Dielectric constant ranged from 8.8 to 18.4, correlating directly with dissipation factor. A yield test with Si0 was carried out in ten consecutive runs, each resulting in ten capacitors. All 100 capacitors, of estimated thickness 6000-7000 A, withstood a 50-v peak ac test without dielectric breakdown even of a transient nature. A similar test with thinner Si0 (approx. 1000 A) and a 10-v maximum are in progress. Of six runs completed thus far, one capacitor on one substrate shorted at 2 v and the remainder withstood 10 v. Life-test equipment was designed and constructed with no failure. (Author)

AD-417 589 **Field 9A, 9C**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
CALCULATION OF POTENTIAL DEPRESSION IN KLYSTRON GAPS,
by R. L. Pease. 23 May 63, 17p Technical rept. TR-316
Contract AF 19 (628)-500, ARPA Order-85

Descriptors: (*Klystrons, Voltage), Space charges, Electron beams, Bessel functions, Programming (Computers).

A calculation in cylindrical geometry for the potential depression in klystron gaps is presented. The results of this calculation, which takes into account the mutual effect of depressed potential and increased charge density, is in the form of a series involving Bessel functions of imaginary argument. Also presented are the numerical results for some typical tube dimensions and operating conditions. It turns out that the effect of an appreciable ratio of tube radius to beam radius is rather large. A FORTRAN program is included as an Appendix. (Author)

AD-423 098 **Field 9A, 20H**
CFSTI Price: HC$13.60
Sperry Gyroscope Co., Great Neck, N. Y. Electronic Tube Div.
SHAPED-FIELD HOLLOW-BEAM ELECTRON GUN.
Oct 63, 137p
Contract AF33 (657)-8857,
Proj. AF-4156,
Task 41533
ASD TDR-63-839

Descriptors: (*Electron guns, Design), Electron beams, Cathodes (Electron tubes), Anodes (Electron tubes), Magnetic fields, Electrons, Space charge, Electron optics.

A new concept for hollow-beam guns was developed, promoting greater potentialities than existed previously. For a beam of given dimensions AND PERVEANCE, A MUCH LARGER CATHODE SURFACE IS ACHIEVED USING A FLARED CATHODE AND FLARED MAGNETIC-FIELD LINES. The magnetic lines then serve to converge the electron trajectories from the large cathode surface to the relatively small beam area. The flared shapes of the cathode and anode also provide a strong axial component of electric field. The electron transit time is thus minimized, and the noise properties are approximately the same as for solid beams. Previous hollow-bema guns were excessively noisy. (Author)

AD-431 989 **Field 9A, 20XX**
CFSTI Price: HC$8.60
Victor Electronic Systems Co., Chicago, Ill.
IMPROVED FREQUENCY-TEMPERATURE CHARACTERISTICS OF QUARTZ CRYSTAL UNITS.
Final rept. no. 2, 1 Jul 62-31 Oct 63.
31 Oct 63, 81p
Contract DA-36-039-sc-90792

Descriptors: (*Quartz resonators, Stability), (*Thermal stresses, Quartz resonators), Frequency, Temperature, Frequency stabilizers, Stresses, Temperature sensitive elements, Compressive properties, Strain (Mechanics), Manufacturing methods, Tests, Crystal holders, Shock resistance, Vibration, Aging (Materials), Seals (Stoppers).

Efforts concerned an investigation of techniques of reducing the frequency drift with temperature of a quartz resonator by means of a temperature-dependent stress applied to the resonator plate. Two different methods for the temperature compensation of an AT type quartz resonator by means of stresses applied to the crystal plate were explored. The first method employs compressional and extensional stresses in the Z direction. The second method utilizes a flexural strain about the X-axis. Compensated resonators of both types were fabricated and tested. These exhibit improved frequency stability as compared to uncompensated resonators. The goal of plus or minus 1 ppm was achieved over the entire -40 to +80 C range with some units utilizing the second compensation method. The majority of a quantity of forty sealed units had a tolerance of plus or minus 2.0 ppm or better over the same range. The feasibility of using the second method of compensation to produce a compensated holder of the HC-6/U type was proved. The results of shock and vibration tests were favorable. An investigation into the basic repeatability of the uncompensated F-T characteristics revealed an aging effect induced by repeated F-T runs and indicated that the basic repeatability may be only about plus or minus 0.5 ppm. (Author)

AD-464 792 **Field 9A**
CFSTI Price: HC$7.60
RCA Labs., Princeton, N. J.
RESEARCH STUDY FOR INCREASING THE SENSITIVITY OF PHOTOEMITTERS.
Final rept., 29 Dec 61-31 Mar 65,
by R. E. Simon, A. H. Sommer, and W. H. McCarroll. 23 Apr 65, 75p
Contract DA-44-099-eng-4913

Descriptors: (*Photocathodes, Preparation), (*Photoelectric effect, Sensitivity), Antimony alloys, Potassium alloys, Cesium alloys, Films, Vapor plating, Crystal structure, Molecular beams, Antimony, Deposition, Ion sources, Crystal lattices, X-ray diffraction analysis, Electron diffraction analysis, Semiconductor devices, Germanium, Field emission.

A summary of the work performed during the contract is presented. This includes a study of variations in processing and composition of S-20 cathodes and the investigation of antimony films deposited from Sb and PtSb beads. Two different phases of K3Sb are described. Formation of photocathodes by sequential and simultaneous deposition from molecular beams of the constituents was examined. The crystal structure of alkali antimonides and other photocathode systems was studied by means of x-ray and electron diffraction. Attempts to produce shallow p-n junctions in germanium for field induced photoemission are described. (Author)

AD-633 496 **Field 9A, 13H, 17B**
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
PRODUCTION ENGINEERING MEASURE FOR SILICON LINEAR INTEGRATED CIRCUITS.
Quarterly progress rept. no. 3, 20 Oct 65-20 Jan 66,
by Robert McGinnis, Thomas Quaid, Thomas Monaghan, and John Hatchett. 20 Jan 66, 37p
Contract DA-36-039-AMC-06158 (E),
Proj. 25001

Descriptors: (*Integrated circuits, Silicon), Manufacturing methods, Linear systems, Radio receivers, Frequency modulation, Portable, Audio amplifiers, Radiofrequency amplifiers, Mixers (Electronics), Radiofrequency oscillators.

The report describes the work accomplished to produce silicon linear integrated circuits of the type used in FM receivers. During this interval, the effort was devoted to producing and evaluating engineering samples of the five different integrated circuits which are to be used in the fabrication of an FM receiver. A modification in the audio amplifier circuit, which will permit a nearly optimum circuit performance, was determined and alteration of the integrated circuit mask set was initiated to incorporate this change. The formalization of circuit test procedures and the construction of an engineering model receiver was also begun during this reporting period. (Author)

AD-633 521 **Field 9A, 20N**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Syracuse, N. Y. Heavy Military Electronics Dept.
SUPER POWER CW TRANSMISSION LINE TECHNIQUES.
Interim rept. Jul-Dec 65,
by Kiyo Tomiyasu. Apr 66, 69p
Contract AF 30 (602)-3810,
Proj. AF-4506,
Task 450602
RADC TR-66-124

Descriptors: (*Waveguides, Radiofrequency power), Cylindrical bodies, Transmission lines, Microwaves, Propagation, Attenuation, Reduction.

Various types of waveguides for the purpose of propagating very high average power with very low loss have been investigated. The most promising mode is considered to be the TE sub 01 mode in greatly oversized circular waveguides. Tentatively the waveguide diameter is about 30 inches for X-band operation with an attenuation of about 3 X 0.000001 db/foot. After investigating several taper designs and fabrication techniques, the multiconical design approach has been selected for this program. The large diameter portions of the taper and the full-size circular waveguide sections will likely be fabricated from sheet metal which is rolled, welded and reinforced. Rectangular waveguide test tapers have been designed and fabricated. By using these, mode conversion characteristics will be measured. A spinning dipole mode analyzer will be used to measure mode conversion in the circular waveguide. Assembly of the components has been started. (Author)

AD-633 615 Field 9A, 9B
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab. Mass. Inst. of Tech., Lexington.
R AND D PROGRAM TO DESIGN AND FABRICATE DIGITAL MONOLITHIC MICROCIRCUITS HAVING AVERAGE PROPAGATION DELAY TIME OF 1 NS.
Progress rept. for seventh quarterly period, 1 Jan-31 Mar 66.
31 Mar 66, 23p
Contracts AF 19(628)-500, AF 19(628)-5167
ESD TR-66-210
Prepared in cooperation with Philco Corp., Lansdale, Pa., Philco-X-507.

Descriptors: (*Circuits, *Microminiaturization (Electronics)), Digital systems, Computer logic, Transistors, Packaged circuits, Circuit interconnections, Silicon, Integrated circuits.

The primary objective of this research and development program is the fabrication of silicon monolithic microcircuits with average propagation delay times in the subnanosecond region. A secondary objective of the program during the remaining quarterly period is to make preliminary investigation of the technological problems that relate to the fabrication of ultra-high-speed complex bipolar arrays. This investigation is directed toward predicting the improvements in speed that will be obtained in digital systems through the fabrication of many very-high-speed monolithic circuits within a single chip. During this reporting period, primary program effort was applied in four main areas: refinement of the techniques required for the design and fabrication of high-speed npn silicon transistors and of digital micro-circuits of the saturating and unsaturating type with better speed-power properties; fabrication and evaluation of the SMX3, a high-speed microcircuit version of an npn ECL circuit used by Lincoln Laboratory; and evaluation of the circuit design and fabrication techniques required for the construction of a complex bipolar microcircuit array for 3-, 9-, and 27-bit versions of a parity generator. (Author)

AD-633 688 Fiel 9A, 13H
CFSTI Prices: HC$1.00 MF$0.50
Bulova Watch Co., Woodside, N. Y. Electronics Div.
PRODUCTION ENGINEERING MEASURE FOR TYPE CR- (XM-60)/U CRYSTAL UNITS.
Quarterly rept. no. 6, Oct-Dec 65,
by G. A. Lagasse. Dec 65, 24p
Contract DA-36-039-AMC-03633 (E)
See also AD-629 434.

Descriptors: (*Quartz resonators, Manufacturing methods), (*Crystal holders, Quartz resonators), Reliability (Electronics), Bonding, Ultrasonic welding, Low frequency, Performance (Engineering), Medium frequency, Aging (Materials).

The new Kold-Weld holders were utilized in a 20 unit crystal group now under test. Evaluations will be made at the end of the test. Thermo-compression bonding had been abandoned early in the program in favor of ultrasonic welding. Efforts, however, will be resumed if ultrasonic welding does not prove practical. The re-evaluation of the reliability data uncovered some serious questions concerning the drive levels of the units under test. The CR- (XM-60)/U units to be manufactured are expected to have much lower resistance values than the present CR-47A/U units, because of process improvements including primarily, the evacuation of the Kold-Weld holders. Under these conditions, the drive levels may very well be in excess of five times the specification, a factor contributing to an increased aging rate, and perhaps, a poorer reliability rate than that of the CR-47A/U units. (Author)

AD-633 723 Field 9A
CFSTI Prices: HC$4.00 MF$0.75
Hamilton Standard Div., United Aircraft Corp., Broad Brook, Conn.
MICROBONDS FOR HYBRID MICROCIRCUITS.
Progress rept. no. 8, 1 Nov 65-31 Jan 66,
by A. R. Riben, and S. L. Sherman. May 66, 111p
HSER-3145
Contract DA-36-039-AMC-03742 (E),
Proj. DA-1P6-22001-A-057,
Task 03
ECOM 03742-8
See also AD-632 928.

Descriptors: (*Circuit interconnections, *Bonding), (*Integrated circuits, Circuit interconnections), (*Microminiaturization (Electronics), Circuit interconnections), Wires, Aluminum, Gold, Metal films, Gold alloys, Chromium alloys, Nickel alloys, Tensile properties, Strength, Resistance welding, Ultrasonic welding, Failure (Mechanics), Resistance (Electrical), Aging (Materials), Thermal stability.

The mechanical strengths (1) 0.001 inch Al wire ultrasonically bonded to Au/Cr films on as-fired alumina, (2) 0.005 inch Au wire resistance welded to Au/Cr films on sapphire, (3) 0.002 inch Au wire resistance welded to Au/Cr films on beryllia, (4) 0.005 inch inch wire resistance welded to Au/Cr films on beryllia, (5) 0.001 inch Al wire ultrasonically bonded to Au/Cr films on sapphire, (6) 0.002 inch Al wire ultrasonically bonded to Au/Cr films on sapphire and (7) 0.002 inch Al wire ultrasonically bonded to Au/Cr films on beryllia were evaluated. The reliability goal of an expected failure of no more than 3 bonds per thousand at the 90% confidence level was met for the no. 3 and 4 microbonds. Electrical resistance measurements demonstrated that all bonds completed to date met the contractual goal. Thermal aging tests indicated that a number of bond types met the contractual goal for a temperature of 125C, and of these all but one met the goal at 200C. Stack welded microbonds consisting of 0.002 in. Au-plated-Ni wire welded to Ni/Au/Cr films on alumina were completed and the maximum number of expected bond failures was 5 per thousand.

AD-633 724 Field 9A, 14D
CFSTI Prices: HC$3.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
QUARTZ CRYSTAL AGING EFFECTS.
Semiannual rept. no. 2, 15 Aug 65-15 Mar 66 (Technical),
by Richard B. Belser, and Walter H. Hicklin. Mar 66, 93p Rept. no. A-680-9, TR-10
Contract DA-36-039-AMC-02251 (E),
Proj. DA-1P6-22001-A-05801
ECOM 02251 (E)-10
See also AD-623 703.

Descriptors: (*Quartz resonators, *Aging (Materials)), Reliability (Electronics), Ultrasonic welding, Failure (Electronics), Low frequency, Medium frequency, High frequency, X-ray diffraction analysis, Temperature.

The purpose of this research is to reduce the aging and failure rates of quartz resonators, thereby increasing their reliability. Aging measurements at 85C of 84 resonators distributed among the frequencies, 81.9, 100, 250, 455, and 500 kilocycles, and among the edge finishes, optically polished, optically polished and etched, and state of the art, revealed little variation in aging rates that might be ascribed to the finish. A series of 10 Mc reliability units aged at 125C exhibited aging behavior dependent on the container type and the accompanying bakeout temperature used. A series of 176 aluminum and gold plated 3 Mc resonators were fabricated, and measured at 85C. A yield of 67 percent of units capable of meeting the specification less than 1 x 10 to the minus 8th power/week after the first 30 days was obtained in spite of several different exploratory fabrication methods employed among the first fabricated resonators. Preliminary fabrication and aging studies of 5 Mc resonators, with aluminum annular ring electrodes, produced units with an average Q of 1,660,000 and very low aging rates. X-ray diffraction topography and SID studies have given valuable aid in analysing aging anomalies in the design of annular ring electrodes, and in the recognition of fundamental and inharmonic modes.

AD-633 734 Field 9A, 13H
CFSTI Prices: HC$1.00 MF$0.50
ITT Electron Tube Div., Roanoke, Va.
PRODUCTION ENGINEERING MEASURE FOR TYPE FW-202 BARRIER GRID STORAGE TUBE.
Quarterly progress rept. no. 15, 1 Jan-31 Mar 65,
by J. D. Hagen. 31 Mar 65, 19p
Contract DA-36-039-sc-85967
See also AD-625 190.

Descriptors: (*Storage tubes, Manufacturing methods), Electron tube targets, Defects (Materials), Electron guns, Production control, Reliability (Electronics), Failure (Electronics).

The pilot production phase of the program was completed. Sixty-nine barrier grid tubes passed complete specification testing and were placed in stock. The low beam current problem was resolved and the single beaded barrier grid gun is now a standard, reliable assembly. The major cause of reject tubes remains defective targets. Although the situation was somewhat improved during this quarter, some further work is still needed in this area, if tube yields above the current 35% to 40% are to be realized. (Author)

AD-633 743 Field 9A, 9E
CFSTI Prices: HC$2.00 MF$0.50
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
STUDY OF RECEIVER MIXER CHARACTERISTICS.
Quarterly rept. no. 3, 1 Dec 65-1 Mar 66,
by E. E. Donaldson Jr., and R. W. Moss. Mar 66, 47p A-868-3
Contract DA-28-043-AMC-01426 (E),
Proj. DA-1E6-20501-D-449
ECOM 01426-3
See also AD-628 324.

Descriptors: (*Mixer tubes, Electrical properties), (*Pentodes, Mixers (Electronic)), (*Triodes, Mixers (Electronic)), Diodes, Radio receivers, Electrical engineering.

Spurious response formations in a 6AS6W pentode mixer and a 6C4 triode mixer were investigated for numerous ordered arrangements of mixer dc parameters, circuit configurations, and signal injection levels. Response levels were measured for different methods of signal and local oscillator injection, and for resistive and tuned load conditions. The results have demonstrated that changes in the mode of signal and/or local oscillator injection, local oscillator level, mixer load conditions, or mixer dc voltages produce changes in response levels that would be difficult to predict. A spurious response prediction technique for diode mixers previously developed at Georgia Tech was investigated to determine if modifications and improvements could be made to reduce prediction errors, and if this technique could be successfully applied to other mixer types. The results of this study are presented in the form of prediction errors derived from the actual prediction of diode and pentagrid mixer data. Maximum-upper-bound prediction methods are discussed, and practical examples of possible techniques are presented. (Author)

AD-633 777 Field 9A, 20L, 9E, 13H K
CFSTI Prices: HC$2.00 MF$0.50
Motorola, Inc., Phoenix, Ariz. Semiconductor Products Div.
THIN FILM TECHNIQUES FOR SILICON INTEGRATED CIRCUITS.
Quarterly progress rept. no. 6, 1 Nov 65-31 Jan 66,
by L. E. Terry, and F. Mancini. May 66, 47p
Rept. no. W-17
Contract DA-28-043-AMC-00097 (E),
Proj. DA-1P6-22001-A-056,
Task 02
ECOM 00097-6
See also AD-632 848.

Descriptors: (*Integrated circuits, *Semiconducting films), (*Films, Integrated circuits), Silicon, Cermets, Vapor plating, Sputtering, Resistors, Capacitors, Compatibility, Anodic coatings, Gates (circuits), Computer logic, Amplifiers, Films, Storage, Resistance (Electrical).

Resistance of electron beam evaporated cermet films was extended to 30,000 ohms/sq. Using the 30 percent A12O3, 70 percent (TaSi and Cr3Si) powder, reproducibility of cermet deposition is being determined. Series of experiments on sputtered tantalum-silicon resistor films were initiated. Concentric circle 50-ohm resistors were fabricated for the ultrahigh frequency measurements experiments. Reactively sputtered Ta2O5 and SiN2 capacitors to 1.5 pf/sq mil and 0.5 pf/sq mil, respectively. 1000 hour 200C storage tests were completed on 100 IC892 resistor-transistor-capacitor units. IC772 circuit performance was reviewed using 200 ohms/sq and 2500 ohms/sq resistors. IC772 was redesigned to include coupling capacitor. Circular 50-ohm thin film resistor characteristics were measured up to 1000 MHz. (Author)

AD-633 783 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Delco Radio Div., General Motors Corp., Kokomo, Ind.
PRODUCTION ENGINEERING MEASURE TO IMPROVE PRODUCTION TECHNIQUES AND INCREASE THE RELIABILITY OF THE SCL7004/21 and SCL7004/22 TRANSISTORS.
Quarterly progress rept. no. 1, 30 Nov 65-28 Feb 66,
by R. P. Anjard. 28 Feb 66, 35p
Contract DA-36-039-AMC-06170 (E)

Descriptors: (*Transistors, Quality control), Production control, Manufacturing methods, Reliability (Electronics), Test methods.

State-of-the-art SCL-7004/21 and SCL-7004/22 samples were supplied; a management plan--Critical Path Plan (Gantt Modified) was submitted and the initial milestone tests were initiated for SCL-7004/21 type devices. Of the seven process improvements, three are being finalized; one is in the state of continuous improvement, two are being initiated and one is scheduled to start March 1, 1966. During this quarter, the Milestone I operating live test was 80% completed and the storage life test 90% completed. The results will be presented in the next quarterly report. (Author)

AD-633 850 **Field 9A, 10B, 9E**
CFSTI Prices: HC$3.00 MF$0.75
Naval Civil Engineering Lab., Port Hueneme, Calif.
LOSSY CONDUCTORS FOR ATTENUATION OF POWER LINE INTERFERENCE.
Final technical rept. May 62-Oct 64,
by D. B. Clark. May 66, 72p TR-R-444
Proj. Y-F006-09-02-201

Descriptors: (*Transmission lines, Attenuation), (*Radiofrequency interference, Transmission lines), Electric cables, Power, Hawaii, Tracking.

The installation of overhead and underground lossy power conductors at the Hawaiian Tracking Station, South Point, Hawaii, has been tested, and the results show that the conducted and radiated interference from the power line are greatly reduced. Measurements of attenuated interference covered the frequency range from 14 kHz to 1,000 MHz. A comparison to previously installed lossy lines shows that the Hawaii line, composed of the latest developments in lossy conductors, is the most effective in attenuating interference. (Author)

AD-633 945 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Honeywell Research Center, Hopkins, Minn.
DIFFUSED RESISTOR TEMPERATURE COEFFICIENT IMPROVEMENT.
Final rept., 2 Feb 65-1 Feb 66,
by Obert N. Tufte. May 66, 98p
Contract AF 30(602)-3672,
Proj. AF-4159,
Task 415912
RADC TR-66-156

Descriptors: (*Resistors, Integrated circuits), (*Semiconductor devices, Integrated circuits), (*Silicon, Resistance (Electrical)), Hall effect, Temperature, Doping, Impurities, Diffusivity, Boron, Phosphorus.

The purpose was to investigate the feasibility of using impurity compensation techniques to lower the temperature coefficient of resistance of silicon diffused resistors. The effect of impurity compensation on the temperature dependence of the resistivity has been investigated in heavily doped n and p-type silicon. Compensation effects were first investigated in bulk doped compensated silicon, and the range of impurity concentrations and compensation ratios that produce changes in the temperature dependence of the resistivity were established. These results were then applied to the formation of compensated diffused resistors having improved temperature coefficients of resistance. The temperature dependence of the resistance in silicon diffused resistors can be reduced to 2% over the range from -30C to +125C by compensation. However, a compensation ratio of approximately 50% is required and these effects occur only for carrier concentrations in the range from 8 x 10 to the 18th power to 2 x 10 to the 19th power/cu cm. Similar effects are found in both n and p-type silicon. In addition, it was found that using the optimum concentrations, the range of sheet resistance over which TCR improvement could be seen was 100 to 300 ohms per square. (Author)

AD-633 976 **Field 9A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Texas Instruments Inc., Dallas.
PRODUCTION ENGINEERING MEASURES (PEM) FOR A GERMANIUM MICROWAVE TRANSISTOR.
Quarterly progress rept. no. 6, 30 Sep-31 Dec 65,
by C. L. White. 31 Dec 65, 50p TI-03-66-24
Contract DA-36-030-AMC-03632 (E),
Proj. DA-74057
See also AD-626 661.

Descriptors: (*Transistors, Manufacturing methods), (*Microwave equipment, Transistors), (*Germanium, Transistors), Electrical properties, Performance (Engineering), Quality control, Production control.

Electrical specifications of the PEM device (type L-148) have been incorporated into the Electronics Command Technical requirements SCL-7730B. They are included in this report. Final approval of the specifications have not yet been announced by USAEC. Forty preproduction samples fabricated during the report period have been tested according to 'Specification for Transistor, Microwave, Germanium (1.5 GHz, 3.0 GHz) Type L-148'. Electrical data on these samples are enclosed. During this report period, a technical problem encountered was caused by defective slice resistivity measuring apparatus. The problem has been corrected and acceptable substrate material is being received. The L-148 pattern is now being used exclusively on the preproduction line. Progress is being made toward realizing the full capability of PEM facilities. A revised list of PEM electrical and environmental test equipment is enclosed. (Author)

AD-634 030 **Field 9A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D.C.
SEMICONDUCTOR WAFER-BONDER,
by Robert J. Anstead. Apr 66, 14p TM-66-4
Projs. DA-1N523801A300, HDL-96300

Descriptors: (*Semiconductor devices, *Bonding), Transistors.

A device for bonding semiconductor devices to headers is described. Individual dice are picked up from an indexing disc with a vacuum pencil and positioned over the header. The weight of the pencil serves as a pressure source on the transistor die while the heat is supplied through a filament heater. The bonding operation is carried out in a forming gas atmosphere. Construction of the instrument and operating procedures are described. (Author)

AD-634 048 **Field 9A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Radio Corp. of America, Mountain Top, Pa. Electronic Components and Devices.
PRODUCTION ENGINEERING MEASURE ON 2N3375 SILICON OVERLAY TRANSISTOR.
Quarterly progress rept. no. 5, 1 Jan-31 Mar 66,
by F. Tumbelty, and J. C. LaBerge. 31 Mar 66, 16p
Contract DA-36-039-AMC-03643 (E)
Proj. 24001
See also AD-626 437.

Descriptors: (*Transistors, Manufacturing methods), Processing, Doping, Oxides, Epitaxial growth, Photoengraving, Bonding, Ultrasonic radiation, Reliability (Electronics), Life expectancy, Silicon.

All processing investigations have been completed and the production runs were started early in February. The improvements and modifications in processing incorporated into the production run are; (1) bulk material improvement, (2) surface stability improvement, (3) metallization interface improvement, (4) improved photolithography, (5) improved wafer handling, and (6) hot spot detection. (Author)

AD-634 049 **Field 9A, 13H**
CFSTI Prices: HC$1.00 MF$0.50
Clevite Corp., Bedford, Ohio. Piezoelectric Div.
PRODUCTION ENGINEERING MEASURE FOR CERAMIC FILTERS.
Quarterly rept. no. 12, 30 Dec 65-29 Mar 66,
by A. Lungo. 29 Mar 66, 19p
Contract DA-36-039-AMC-01471 (E)
See also AD-629 718.

Descriptors: (*Radiofrequency filters, Ceramic materials), (*Ceramic materials, *Filters (Electromagnetic wave)), Resonators, Manufacturing methods, Piezoelectric crystals, Tuning devices, Test equipment, Packaging.

During this period we have directed effort toward fabrication of the resonators required for the preproduction and pilot production filters. Also, a group of 6.0 Mc ceramic ladder filters were assembled and evaluated for the correlation of temperature dependency of the assembled filters' center frequencies to the frequency temperature characteristics of the resonators. Effort was also directed toward packaging 4.3 Mc and 6.0 Mc single resonator filters. Units were assembled, and the electrical characteristics which would be affected by the packaging were evaluated. (Author)

AD-634 064 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
New York Univ., N. Y. Lab for Electroscience Research.
ON THE ANALYSIS OF COMPOSITE LUMPED-DISTRIBUTED SYSTEMS.
Technical rept.,
by John J. Kelly, Mohammed S. Ghausi, and James H. Mulligan Jr. Mar 66, 50p TR-400-128,
Scientific-1
Contract AF 19(628)-5537
Proj. AF-5628
Task 562806
AFCRL 66-278

Descriptors: (*Data transmission systems, *Electrical networks), Analysis, Microminiaturization (Electronics), Integrated circuits, Locus.

Fabrication methods associated with modern microelectronic technology have stimulated detailed investigation of the properties of distributed active and passive transmission systems. As a consequence, there have appeared recently several interesting results concerning the analysis and synthesis of distributed networks. As one attempts to realize practical microelectronic systems, however, one confronts structures which require treatment as combinations of lumped and distributed networks. This report presents an analysis technique directly applicable to such composite configurations and gives examples of its application to several systems of current engineering interest. The technique is basically a generalization of root locus methods used in the analysis and synthesis of lumped systems. To permit applicability to composite lumped-distributed systems, one requires a generalization of the rules of construction applicable to systems with a countably infinite number of poles and zeros. In the report these rules are derived and their use is illustrated by several typical examples. Significant insight into the analysis and synthesis of composite lumped-distributed systems is obtained when use is made of the generalized root locus technique described in this report. (Author)

AD-634 088 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Radio Corp. of America, Somerville, N. J. Defense Microelectronics.
THIN-FILM POLYCRYSTALLINE FIELD-EFFECT TRIODE.
Quarterly rept. no. 6, 1 Oct-31 Dec 65,
by J. J. Bowe, R. L. Schelhorn, F. V. Shallcross, A. S. Waxman, and P. K. Weimer. May 66, 61p
Contract DA-28-043-AMC-00231 (E)
Proj. DA-1P6-22001-A056
Task 1P6-22001-A05602
ECOM 00231-6
See also AD-631 409.

Descriptors: (*Triodes, Semiconducting films), (*Transistors, Semiconducting films), Microstructure, Cadmium alloys, Selenium alloys, Cadmium compounds, Silicon compounds, Sulfides, Oxides, Photoelectric effect, Voltage.

Capacitance measurements on CdS-Si0-Al structures at various well-controlled temperatures have indicated that the nature of the instabilities under applied bias can be irreversibly changed by heating the sample in vacuum from 25 to 50 C. Several mechanisms appear to be involved in these instabilities. Silica films deposited by resistance heating of Si02 are under study as encapsulants for M-I-S structures; refractive index data imply that the Si02 films are not completely stoichiometric. Photoemission of electrons into thin-film vapor-deposited insulators has been used to study the energy band diagram of thin-film vapor-deposited metal-insulator-semiconductor contacts and thin-film metal-insulator-metal contacts. The insulators studied to date have been Si0 and Si02. We have found a barrier between Si0 and Au of 3.6 plus or minus 0.15 eV and an energy barrier of 4.8 plus or minus 0.2 eV between Si0 and CdSe. The photocurrent-voltage relationships of M-I-S structures and metal-insulator-metal structures are briefly discussed. (Author)

AD-634 089 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
EVALUATION OF THE NUVISTOR TRIODE TYPE 8056.
Technical rept.,
by W. G. Muessle. Apr 66, 33p ECOM-2700
Proj. DA-1P6-22001-A-055
Task 1P6-22001-A-055-02-17

Descriptors: (*Triodes, Performance (Engineering), Metals, Ceramic materials, Electron tube parts, Electrical engineering.

Identifiers: Nuvistors.

The type 8056 nuvistor triode was evaluated to determine its capabilities for military application. Data are presented for static characteristics, power gain, noise figure, input admittance, cross modulation, and rf power output. (Author)

N66-21298 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
METAL OXIDE SEMICONDUCTOR (MOS) TRANSISTOR RESEARCH AND DEVELOPMENT PROGRAM. PART II. DEVELOPMENT OF STABLE COMPLEMENTARY MOS FIELD EFFECT TRANSISTORS.
Final rept., Mar-Nov 65,
by J. R. Cricchi, and M. H. White. 1965, 42p
Contract NAS5-3758
NASA CR-70390

Descriptors: *Metal oxide semiconductor (MOS), *Production engineering, *Epitaxial deposition, *Transistor.

N66-21659 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
CADD - ON-LINE SYNTHESIS OF LOGIC CIRCUITS,
by M. L. Dertouzos, and P. J. Santos, Jr. Dec 65, 91p ESL-R-253
Grant NsG-496
NASA CR-71418

Descriptors: *Computer program, *Logic circuit, *On-line programming, *Man-machine system.

N66-21693 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Sperry Farragut Co., Bristol, Tenn.
REACTION WHEEL WITH BRUSHLESS DC MOTOR DRIVE.
Final rept.,
by W. M. Casaday. Apr 66, 64p
Contract NAS5-9016
NASA CR-388

Descriptors: *Direct current (DC), *Transistor circuit, *Electric motor, *Engineering development, *Inertia wheel.

N66-21769 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.75
Continental Testing Labs., Inc., Orlando, Fla.
SEMICONDUCTOR DEVICE QUALIFICATION TESTS, GENERAL SPECIFICATION.
1965, 83p Report no. 11253-8-1
Contract NAS8-11253
NASA CR-71410

Descriptors: *Silicon transistor, *Environmental testing, *N-P-N junction, *Semiconductor device.

N66-21785 **Field 9A**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Electronic Systems Lab.
A STUDY OF CD S THIN-FILM VACUUM-ANALOG TRIODES,
by A. A. Aponick. Dec 65, 35p ESL-TM-247
Grant NsG-496
NASA CR-71552

Descriptors: *Cadmium sulfide, *Thin film, *Electron tube, *Triode.

N66-22182 **Field 9A**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
MICROELECTRONICS,
by C. Husson. 1964, 25p NASA-TM-X-56533

Descriptors: *Microcircuit, *Microelectronics.

N66-22344 **Field 9A**
CFSTI Prices: HC$3.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Missile and Space Div.
DEVELOPMENT OF ELECTRICAL SWITCHGEAR FOR SPACE NUCLEAR ELECTRICAL SYSTEMS.
Quarterly progress rept. no. 5, 4 Dec 65-4 Mar 66,
by A. H. Powell. 1966, 54p
Contract NAS3-6467
NASA CR-54924

Descriptors: *Actuator, *Electric equipment, *Circuit breaker, *Switch.

PB-170 552 **Field 9A**
CFSTI Prices: HC$7.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
FIABILITE DE TRANSISTORS AU SILICIUM, A STRUCTURE PLANE, SOUMIS AU RAYONNEMENT GAMMA DU 60C0 (Reliability of Planar Silicon Transistors Exposed to 60C0 Gamma Rays),
by Andre Blin, and Jacques Le Ber. Mar 66, 79p
CEA-R-2959
Text in French; Attached summary in English.

Descriptors: (*Transistors, Silicon), (*Reliability (Electronics), Transistors), Gamma rays, Cobalt, Radioactive isotopes, Gain, France.

The variation of the average values of the parameters of lots under test are considered. A more complete statistical study is carried out (distribution of the values of the parameters within the lots; research of correlations, etc.). It is clearly stated and shown that evaluation of the degradation of the gain of transistors depends on: the conditions of measurement (voltage, current), after irradiation; the polarisation of the elements during irradiation; and the origin of manufacture of the lots under test (4 manufacturers). The difficulties met to predict the behaviour of the transistors under radiation stress are shown, and attempt is made to define practical rules for design engineers. (Author)

AD-409 705 **See Field 20C**

AD-413 089 **See Field 20L**

AD-441 646 **See Field 17E**

AD-461 567 **See Field 17E**

AD-474 878 **See Field 17E**

AD-633 468 **See Field 18H**

AD-633 478 **See Field 9E**

AD-633 685 **See Field 20C**

AD-633 955 **See Field 20L**

AD-634 004 **See Field 13D**

9B. COMPUTERS

AD-447 329 **Field 9B, 14A**
CFSTI Price: HC$5.60
System Development Corp., Santa Monica, Calif.
FACTORS THAT AFFECT THE COST OF COMPUTER PROGRAMMING,
by Leonard Farr, and Burt Nanus. 30 Jun 64, 59p
Technical memo. TM-1447/000/02
Contract AF 19 (628)-3418

Descriptors: (*Cost effectiveness, Programming (Computers), (*Programming (Computers), Costs), Management planning, Manpower studies, Training, Data processing systems, Reports, Management engineering.

Although accurate estimation of computer programming costs is an important prerequisite for effective programming management, such estimates have historically been very unreliable. Some of the underlying causes of this problem are discussed, and about fifty factors that appear to contribute to the cost of computer programs are identified. Data concerning the effects of a few of these factors upon cost are presented by way of illustration. Recommendations are made for more detailed cost collection, cost analysis, and experimentation. (Author)

AD-470 715 **Field 9B**
CFSTI Prices: HC$18.50 MF$1.00
Massachusetts Inst. of Tech., Cambridge.
AN ANALYSIS OF TIME-SHARED COMPUTER SYSTEMS.
Technical rept., 29 Dec 64-4 Feb 65 (Doctoral thesis),
by Allan Lee Scherr. Jun 65, 189p MAC-TR-18
Contract Nonr-4102 (01),
Proj. NR-048-189
Rept. on Proj. MAC.

Descriptors: (*Computers, Multiple operation), (*Scheduling, Computers), Real time, Man-machine systems, Systems engineering, Analysis.

Identifiers: MAC project, Time sharing (Computers).

Some of the aspects of the operation of time-shared, interactive computer systems are analyzed. The emphasis is on the reaction of hardware systems to the demands that its users make upon it. Portions of this problem include the specification and measurement of user characteristics, the development and verification of both simulation and mathematical models for time-shared systems, and the specification and measurement of performance metrics for such systems. First, simulation models are used to study the effects of changing small details in the operation of CTSS-like systems. Then, a continuous-time Markov process model is derived to predict the performance of a broad class of systems. Throughout, the CTSS data are used as a basis for comparison with model predictions. (Author)

AD-633 556 **Field 9B, 5I**
CFSTI Prices: HC$7.00 MF$1.50
Navy Electronics Lab., San Diego, Calif.
PROGRAMMING THE CP-667. A SELF-INSTRUCTION MANUAL,
by James A. Saxon, and Marnette Moles. Apr 66, 322p

Descriptors: (*Programming (Computers), Instruction manuals), (*Programmed instruction, Programming (Computers)), Computers.

Identifiers: CP-667 computer.

AD-633 661 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
INVESTIGATION OF THE ALGORITHM USED IN A SPECIALIZED DIGITAL COMPUTER FOR CONVERSION OF EQUATORIAL COORDINATES TO AZIMUTHAL COORDINATES,
by S. V. Korotkov, V. A. Myasnikov, and V. T. Pivovarov. 18 Feb 66, 18p FTD-MT-65-415
TT 66-61400
Edited machine trans. of Sbornik Rabot po Voprosam Elektromekhaniki (USSR) n9 p87-101 1963.

Descriptors: (*Algorithms, *Digital differential analyzers), Integrators*(Computers), Trigonometry, Design, USSR.

AD-633 716 **Field 9B, 20N**
CFSTI Prices: HC$7.00 MF$1.75
Navy Electronics Lab., San Diego, Calif.
A HIGH-FREQUENCY PROPAGATION PREDICTION PROGRAM FOR THE CDC 1604 COMPUTER.
Research and development rept. Apr 64-Sep 65,
by D. B. Sailors. 28 Feb 66, 331p NEL-1358
Proj. SS-261-001,
Task 7429

Descriptors: (*Programming (Computers), Propagation), (*Radio waves, Propagation), High frequency, Naval equipment, Communication systems, Mathematical prediction.

Identifiers: CDC-1604 computer, Neliac program.

Two programs are presented, written in NELIAC 5M for the CDC 1604 computer: the basic geometry, which organizes equipment parameters for computer handling and makes preliminary calculations; and the HF Propagation Prediction Program, which calculates critical frequencies, losses, S/N ratio, and signal strength for each link. Average calculation time for each link for each time of day, month, and sunspot number is about 7 seconds, as compared to about 10 hours by hand calculation. Assumptions, operating instructions, auxiliary routines, description of outputs, and error indications are included. (Author)

AD-633 727 **Field 9B**
CFSTI Prices: HC$5.00 MF$1.00
Columbia Univ., New York. Dept. of Electrical Engineering.
STUDY OF A COMPUTER DIRECTLY IMPLEMENTING AN ALGEBRAIC LANGUAGE.
Final technical rept., 1963-1965,
by Theodore R. Bashkow, Azra Sasson, and Arnold L. Kronfeld. Jan 66, 171p TR-87, CU-1-66-AF-2798-EE
Contract AF 19 (628)-2798,
Proj. AF-464105
AFCRL 66-95

Descriptors: (*Programming languages, *Digital computers), Algebra, Computer logic, Programming (Computers), Design.

A system design is given for a computer capable of direct execution of FORTRAN source statements. The allowed types of statements are the FORTRAN Arithmetic, DO, GO TO, computed GO TO, arithmetic IF, READ, PRINT, DIMENSION, CONTINUE, PAUSE and END statements. Up to two subscripts are allowed for variables and no FORMAT statement is required. The programmers source program is converted to a slightly modified from while being loaded and placed in a Program Area in lower memory. His original variable names and statement numbers are retained in a Symbol Table in upper memory, which also serves as the data storage area. During execution of the program each FORTRAN statement is read and interpreted at basic circuit speed since the machine is a hardware interpreter for these statements. The machine corresponds therefore to a 'one-pass, load-and-GO' compiler except, of course, that there is no translation to a different machine language. The design information is presented in the form of Mealy state diagrams for each of the statement loading and execution circuits plus some utility circuits. A method is also described for going from the state diagrams to the logic circuits which generate and sequence the required microsteps (register gate control signals, memory read and write commands, etc.) (Author)

AD-633 780 **Field 9B, 20C, 20F**
CFSTI Prices: HC$1.00 MF$0.50
LFE Electronics, Boston, Mass. Solid State Electronics Lab.
ELECTRO-OPTICAL MATRIX DISPLAY.
Interim development rept. for 18 Dec 65-18 Mar 66.
18 Mar 66, 14p 480-Q6
Contract NObsr-91199
See also AD-627 696.

Descriptors: (*Thin film storage devices, Display systems), (*Electrooptics, Thin film storage devices), (*Computer storage devices, Thin film storage devices), Colloids, Glycerols, Glycols, Plastics, Substrates, Manufacturing methods.

Colloid lifetimes for sustained mobility have now exceeded six months in bench tests, and tests of units in actual display operation indicates that lifetimes can also be very long in functioning displays. RIS Films have been prepared on plastic substrates giving rise to the promise of all-plastic units which would greatly simplify the technology of sealing, and would drastically lower the price of display panels. A sealing technique involving all-glass units appears to show considerable promise of solving the glass-sealing problem. Panels for 4in x 8in display have been constructed, and illumination provided by means of incandescent and high pressure discharge lamps. Heat effects are the most serious problem in the current arrangement. AC frequency has been found to be a non-critical factor in display switching, and curves have been obtained which show optimum choices for number of cycles of AC, and pulse current amplitudes. (Author)

AD-633 878 **Field 9B, 15E, 14A**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
HOW TO ESTIMATE THE INVESTMENT COST OF ELECTRONIC DATA PROCESSING EQUIPMENT,
by Martin V. Jones. May 66, 39p MTR-70
Contract AF 19 (628)-5165,
Proj. AF-800C
ESD TR-66-71

Descriptors: (*Data processing systems, *Costs), (*Command + control systems, Data processing systems), Air force equipment, Cost effectiveness.

This document seeks to provide practical guidance to analysts charged with estimating the investment costs of the electronic data processing equipment of Air Force Command and Control systems. The document is also offered as a methodological prototype for writing similar item-oriented reports on other major items of Air Force systems, such as communications equipment, radar, sensors, display equipment, computer programming, and the major subsystems of aircraft, ballistic missiles, and space systems. (Author)

AD-633 892 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
COMPUTER TECHNOLOGY: COMPILATION OF ABSTRACTS.
Rept. no. 6 on Work Assignment no. 81,
by Boris Doncov. 1 Apr 66, 46p ATD-66-37
TT 66-61430
Based on Soviet open sources pub. 1965. Rept. on Surveys of Soviet Scientific and Technical Literature. See also AD-633 373.

Descriptors: (*Computers, *Bibliographies), Design, Computer logic, Scheduling, USSR.

The 38 abstracts are arranged alphabetically by author within eachof the following categories: components (5 entries), design (10 entries), applications (11 entries), and associated systems (12 entries). A bibliography comprising 38 entries is included. Other information included: tunnel diode memory cell, transfluxors, parametron, three-phase pulse generator, switching diode, cryotron memory unit, digital computer, digital computer storage of meterological information, document information retrieval system, analog computer,

program control, computer photoreaders, automatic programming, automatic control, analog-digital multipliers, magnetic tape signal coding, digital counter, computer circuit. (Author)

AD-633 907 **Field 9B**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
AN EMPIRICAL COMPARISON OF ON-LINE AND OFF-LINE DEBUGGING.
Professional paper,
by E. E. Grant. 18 May 66, 19p SP-2441
Contract AF 19 (628)-5166, ARPA Order-773

Descriptors: (*Programming (Computers), Corrections), Computer personnel, Operations research, Performance tests, Time studies, Algebra, Equations, Simulation, Scheduling, Multiple operation, Human engineering.

Identifiers: Time sharing (Computers), On-line systems, Debugging (Computers), Off-line systems.

The experiment compared the program debugging (checkout) performance of programmers using a Time-Sharing System (TSS) with the debugging performance of programmers using a simulated closed shop. Twelve programmers participated in the study. Each programmer was given two problem statements and was asked to write a program to solve each. One proglem required a program to interpret and solve algebraic equations. The other problem required a program to find the single path through a 20 x 20 cell maze represented in the computer by a 400-entry table. Six solutions (programs) to each problem were debugged on line using TSS and six were debugged off line using a simulated closed-shop system with a desk-to-desk turnaround time of two hours. Performance was measured in terms of man hours to debug and central processor time used in debugging. Programmers who debugged their algebraic interpretation programs on line used slightly fewer man hours and about three times as much central processor time as did programmers who debugged these programs off line. Programmers who debugged their maze programs on line used about one-third as many man hours and slightly more central processor time than those who debugged their maze programs off line.

AD-633 908 **Field 9B, 5A**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
COMPUTERIZATION: SOME IMPLICATIONS FOR DECISION MAKING.
Professional paper,
by G. H. Perry. 30 May 66, 17p SP-2487

Descriptors: (*Decision making, Automation), (*Computers, Decision making), Management engineering, Theory, Economics, Documentation.

Decision making is discussed both in a broad economic context and in a specific definitional sense, and is then related to the informational revolution, or computerization. The directional and dimensional changes in the decision making process that appear to be imminent or already underway are described, and predictions are made of the effects these changes will have upon managers' jobs in the near-term future. (Author)

AD-633 909 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
OPERATIONAL MANAGEMENT OF TIME-SHARING SYSTEMS.
Professional paper,
by Richard R. Linde, and Paul E. Chaney. 6 Jun 66, 34p SP-2392
Contract AF 19 (628)-5166, ARPA Order-773
Prepared for the National ACM Conference (21st), Los Angeles, California, August 30-September 1 1966.

Descriptors: (*Scheduling, Management control systems), (*Management control systems, Computer operators), Computers, Multiple operation, Systems engineering.

Identifiers: Time sharing (Computers).

The paper describes the Manager program, a set of control techniques developed to provide the computer operator with the means for managing the System Development Corporation's Time-Sharing System. The paper reviews the approach of the SDC system, contrasts some system management techniques with those in use at other large time-sharing installations throughout the country, and describes briefly the operation of the Manager program. Additional details are presented on the visual displays that are a part of the program and are used to illustrate the description of program use. (Author)

AD-633 911 **Field 9B, 5J**
CFSTI Prices: HC$1.00 MF$0.50
System Development Corp., Santa Monica, Calif.
BINARY PREDICTION BEHAVIOR WHEN THE GENERATING SOURCE RESEMBLES A LANGUAGE.
Professional paper,
by Burton R. Wolin, and Rosemarie Weichel. 31 Mar 66, 24p SP-1953/001/00

Descriptors: (*Binary arithmetic, *Artificial intelligence), Learning, Sequences, Syntax.

Complex learning behavior was investigated in a highly structured binary choice situation. The language-like generating source produced an event sequence which was completely defined by 17 different rules. Two of these rules were stochastic. Interest was focused on the learning process and the presence or absence of artificial memory. Results demonstrated the importance of artificial memory, not so much in the kind of learning that occurred but in the rate, amount and completeness of the learning process. Ss who learned one rule well generally learned them all well, including the stochastic rules. There was no evidence that the learning process was strongly influenced by the hierarchical structure of the source. Instead, learning was contingent upon the emergent structure of the event sequence. (Author)

AD-633 929 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
THE Q-32 LISP 1.5 MOD. 2.6 SYSTEM: OPERATING SYSTEM, INPUT-OUTPUT, FILE, AND LIBRARY FUNCTIONS.
Technical memo.,
by S. L. Kameny, and C. Weissman. 11 Apr 66, 29p TM-2337/103/00
Contract AF 19 (628)-5166, ARPA Order-773

Descriptors: (*Data processing systems, Programming languages), (*Programming languages, Instruction manuals), (*Compilers, Programming languages), (*Information retrieval, Programming languages), Computers, Scheduling, Search theory, Input-output devices, Computer storage devices.

Identifiers: AN/FSQ-32, LISP.

This document supplements TM-2337/101/00 (AD-622 018) by describing the input-output, file-handling, and library functions of Q-32 LISP 1.5 Mod. 2.6. It also describes differences between Mod. 2.6 and the previous Mod. 2.5 described in TM-2337/102/00 (AD-622 022) dated 9 August 1965. (Author)

AD-633 930 **Field 9B, 5B**
CFSTI Prices: HC$3.00 MF$0.50
System Development Corp., Santa Monica, Calif.
SEMIANNUAL TECHNICAL SUMMARY REPORT TO THE DIRECTOR, ADVANCED RESEARCH PROJECTS AGENCY FOR THE PERIOD 18 NOVEMBER 1965 THROUGH 17 MAY 1966.
Technical memo.,
by C. Baum. 17 May 66, 54p TM-687/006/00
Contract AF 19 (628)-5166, ARPA Order-773

Descriptors: (*Information retrieval, State-of-the-art reviews), (*Programming languages, State-of-the-art reviews), (*Data processing systems, Computers), (*Computers, Scheduling), Syntax, Programming (Computers), Compilers, Systems engineering, Command + control systems.

Identifiers: LUCID, TIEL, LISP, Time sharing (Computers).

This report describes work done in the ARPA-sponsored Information Processing Techniques and Command and Control Research and Laboratory Program from 18 November 1965 through 17 May 1966. Projects covered are Time-Sharing, Data Base Systems, Computer Processing of Natural Language, and the Research and Technology Laboratory. (Author)

AD-634 086 **Field 9B, 15C**
CFSTI Prices: HC$6.00 MF$1.25
Navy Electronics Lab., San Diego, Calif.
SERIAL DIGITAL COMPUTATIONAL UNITS: TECHNIQUE DEVELOPMENT. SINE-COSINE FUNCTION GENERATORS AND SUPPORTING TECHNIQUES ARE APPLIED IN A BREADBOARD INTERCEPT COMPUTER.
Research and development rept., Jan 60-Feb 65,
by L. G. Harris, and H. Nathan. 23 Nov 65, 231p NEL-1332
Proj. SS-19103
Task 6013

Descriptors: (*Aircraft intercept control systems, *Digital computers), (*Analog computers, Aircraft intercept control systems), (*Data processing systems, Computers), Digital different analyzers, Trigonometry.

Sine-cosine function generators using digital-differential-analyzer techniques and capable of three modes of operation were designed and evaluated. The units were expanded into a breadboard intercept computer system by development of ancillary digital techniques. (Author)

N66-22275 **Field 9B**
CFSTI Prices: HC$4.00 MF$0.75
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
SPACE-CHARGE-FLOW COMPUTER PROGRAM,
by C. D. Bogart, and E. A. Richley. Apr 66, 119p NASA-TN-D-3394

Descriptors: *Axisymmetric flow, *Space charge, *Two-dimensional flow, *Computer program, *Fortran.

N66-22364 **Field 9B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
INTEGRATED TELEMETRY-COMPUTER SYSTEM,
by D. E. Jamison. Apr 66, 28p NASA-TN-D-3396

Descriptors: *Digital computer, *Signal processing, *Pulse frequency modulation (PFM).

N66-22378 **Field 9B**
CFSTI Prices: HC$14.65 MF$7.00
Operations Research, Inc., Santa Monica, Calif.
PROPULSION AND SPACE VEHICLE SYSTEMS ANALYSIS PROGRAM TENSOR I. VOLUME I,
by J. B. King, G. L. Ordway, W. E. Schuman, R. J. Krane, and A. Reiff. 30 Sep 65, 1165p
Technical rept. TR-341
Contract NAS8-5321
NASA CR-71904

Descriptors: *Computer program, *Space vehicle, *Systems analysis.

AD-410 546 See Field 9E

AD-412 632 See Field 9D

AD-414 428 See Field 5H

AD-421 814 See Field 20M

AD-446 626 See Field 17H

AD-477 579 See Field 15G

AD-633 609 See Field 9E

AD-633 613 See Field 9C

AD-633 615 See Field 9A

AD-633 628 See Field 22C

AD-633 642 See Field 6D

AD-633 678 See Field 17B

AD-633 711 See Field 17B

AD-633 720 See Field 22C

AD-633 721 See Field 22C

AD-633 775 See Field 9C

AD-633 863 See Field 8E

AD-633 864 See Field 8E

AD-633 910 See Field 5A

AD-633 923 See Field 5I

AD-633 927 See Field 12A

AD-633 928 See Field 12A

AD-634 014 See Field 5G

AD-634 015 See Field 5G

9C. ELECTRIC AND ELECTRONIC ENGINEERING

AD-633 608 **Field 9C, 9E**
CFSTI Prices: HC$5.00 MF$1.00
Foreign Technology Div., Wright-Patterson AFB, Ohio.
STEADY-STATE REGIMES IN LINEAR AND NONLINEAR CIRCUITS,
by I. E. Srednii. 23 Feb 66, 161p FTD-TT-65-1556
TT 66-61389
Unedited rough draft trans. of mono. Statsionarnye Rezhimy v Lineynykh Tsepyakh, Kiev 1963 168p.

Descriptors: (*Circuits, Pulse generators), (*Oscillators, Mathematical analysis), (*Pulse generators, Mathematical analysis), Harmonic analysis, Functional analysis, Power series, Fourier analysis, Series, Electrical engineering, Linear systems, Nonlinear systems, USSR.

This book presents a new method for the pulse analysis of oscillations which is based on the expansion of periodic functions into functional-power series. The method is used for the description of stationary regimes in linear and nonlinear circuits. Primary attention is devoted to determination of the response of the system to a discontinuous-periodic input. The book includes the solution of several problems in pulse engineering and self-oscillation theory. The book is intended for engineers and technicians working with pulse techniques and may also be of use to the students of advanced courses in electronics. (Author)

AD-633 613 **Field 9C, 12A, 9B**
CFSTI Prices: HC$3.00 MF$0.75
Electronic Defense Labs., Sylvania Electronic Systems-West, Mountain View, Calif.
THE APPLICATION OF CARROLL'S TECHNIQUE TO COMPUTER-AIDED DESIGN.
Technical memo.,
by E. A. Huber. 17 Nov 65, 63p EDL-M881
Contract DA-28-043-AMC-00379 (E)

Descriptors: (*Networks, Synthesis), (*Nonlinear programming, *Electrical networks), Functions, Topology, Combinatorial analysis, Iterative methods, Electrical engineering, Programming (Computers), Experimental design.

Identifiers: Carroll's method.

Network synthesis and transfer-function estimation are considered as parameter-estimation problems. Particular emphasis is given to the synthesis of linear electrical networks. To minimize the desired error measure, iterative gradient techniques are used to adjust the parameters automatically. Constraint equations to insure physical realizability are handled by means of Carroll's nonlinear programming technique. This technique transforms the minimization-with-constraints problem into an unconstrained minimization problem. The result is an automatic procedure which requires the designer's experience in setting up the problem but uses the digital computer to perform the tedious labor. Pertinent examples of this procedure are presented. (Author)

AD-633 775 **Field 9C, 17B, 4B, 9B K**
CFSTI Prices: HC$3.00 MF$0.75
Army Electronics Command, Fort Monmouth, N. J.
BIBLIOGRAPHY OF PUBLICATIONS AND PRESENTATIONS, 1965 (WITH KWIC INDEX).
Apr 66, 56p

Descriptors: (*Electronics, *Bibliographies), (*Meteorology, Bibliographies), (*Communication systems, Bibliographies), Electrical engineering, Data processing systems, Combat surveillance, Aeronautics, Navigation, Electromagnetic warfare, Power supplies, Subject indexing.

Identifiers: KWIC index.

This bibliography lists 369 technical publications and presentations written by personnel of the U. S. Army Electronics Command during calendar year 1965. The entries appear alphabetically by senior author, and a Key Word in Context (KWIC) index is provided for retrieval of titles by subject area. United States patents granted to ECOM personnel are listed separately. Among the broad subject areas covered in the bibliography are: electronic engineering, communications, automatic data processing systems, combat surveillance, avionics, navigation, atmospheric sciences, electronic warfare, electronic components, power sources, materials and related fields of physics and mathematics. (Author)

AD-633 975 **Field 9C, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics.
OSCILLATIONS IN A CLASS OF MULTILOOP SYSTEMS CONTAINING TWO NONLINEARITIES.
Scientific rept.,
by Lawrence P. Grayson. Apr 66, 30p
Contract AF 49 (638)-496
Proj. AF-9783
Task 978302
AFOSR 66-0621

Descriptors: (*Oscillation, *Control systems), Nonlinear systems, Feedback, Functional analysis.

This paper presents a procedure for the analysis of a class of multiloop nonlinear systems containing two nonlinearities. The approach treats the effects of the linear and nonlinear elements separately, with the result that stability can be determined and limit cycles predicted from the open-loop frequency response data of the individual components. The technique is graphical and allows simple design to be performed. An example is given; limit cycles are predicted and compared with the results of computer simulation. (Author)

AD-634 122 **Field 9C, 12B**
CFSTI Prices: HC$4.00 MF$0.75
Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
SOME TECHNIQUES FOR THE SYNTHESIS OF NONLINEAR SYSTEMS.
Technical rept. (Doctoral thesis),
by Aubrey M. Bush. 25 Mar 66, 103p TR-441
Contract DA-36-039-AMC-03200 (E), Grant NSF-GP-2495,
Proj. 200-14501-B31F
Grants NIH-MH-04737-05, NsG-496.

Descriptors: (*Nonlinear systems, *Synthesis), Control systems, Integral transforms, Invariance, Simulation.

Identifiers: Sampled data systems, Theses.

The systems considered are those that can be characterized by a finite set of Volterra kernels. The approach is to consider the kernels one at a time, by using as basic elements in the synthesis linear systems and multipliers. The author presents a procedure for testing a given kernel transform to determine whether or not the kernel can be realized exactly with a finite number of linear systems and multipliers. The test is constructive. If it is possible to realize the kernel exactly, a realization is given by the test; if it is not possible to realize the complete kernel exactly, but is possible to break the kernel up into several lower degree components, this will also be discovered by the test. An extension to nonlinear systems of the impulse-train techniques of linear system theory is given. He develops properties of sampling in nonlinear systems, in order to facilitate the use of digital techniques in the synthesis of nonlinear systems. Bandlimiting in nonlinear systems is discussed, and delay-line models for bandlimited systems are given. The transform analysis of nonlinear sampled-data systems by means of the multidimensional z-transform is presented. Computation algorithms for input-output computations are given for direct computation from the multidimensional convolution sum, the associated partial-difference equation, and a decomposition of the nonlinear sampled-data system into linear sampled-data systems. (Author)

N66-21775 **Field 9C**
CFSTI Prices: HC$1.00 MF$0.50
Lockheed Missiles and Space Co., Huntsville, Ala. Huntsville Research and Engineering Center.
REDUCTION OF ELECTRICAL NOISE AND CROSSTALK IN GUIDANCE SYSTEM COMPONENTS.
Progress rept., Sep 1965,
by L. J. Little. 15 Oct 65, 14p LMSC-HREC-A712335
Contract NAS8-20118
NASA CR-71545

Descriptors: *Servo loop.

AD-417 589 See Field 9A

AD-633 815 See Field 9D

AD-634 098 See Field 10B

9D. INFORMATION THEORY

AD-410 883 **Field 9D**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A NOTE ON SEQUENTIAL DECODING APPLIED TO LARGE ALPHABET INCOHERENT CHANNELS-RCOMP DETERMINATION,
by Maxine H. Check, nd Barney Reiffen. 31 May 63, 11p 65G-6
Contract AF 19 (628)-500

Descriptors: (*Taylor's series, Sequential analysis), (*Information theory, Noise (Radio)), Integrals, Bessel functions, Probability, Errors, Coding, Band-pass filters, Detection, Radiofrequency, Signals, Decoding.

Interest in large alphabet signaling systems to which sequential decoding procedures can be applied has prompted an investigation of the computation cutoff rate for such channels. This report restricts itself to incoherent channels, where the meaning of 'incoherent' will be made precise presently. Suppose one of 1 orthogonal and equal energy bandpass signals is sent over a channel perturbed by additive white Gaussian noise. The prior probability of all signals is assumed equal. The received signal is detected by a bank of 1 filters matched to the 1 waveforms. The envelopes of the filter outputs are formed and are sampled at the appropriate time. This detection procedure is optimum if the receiver does not have knowledge of the RF phase of the signal, and if the RF phase, whatever it is, is constant over the signaling interval. A decoder has available to it the 1 analog outputs. A decision on the largest of these destroys information. Accordingly, if coding is to be used, it is appropriate to view the 1 analog outputs as a vector which may be operated on by a decoder. (Author)

AD-412 632 **Field 9D, 9B**
CFSTI Price: HC$3.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN INVESTIGATION OF THE FANO SEQUENTIAL DECODING ALGORITHM BY COMPUTER SIMULATION,
by G. Blustein and K. L. Jordan Jr. 12 Jul 63, 37p 62G-5
Contract AF 19 (628)-500

Descriptors: (*Communication theory, Simulation), (*Coding, Electronic equipment), Computers, Communication systems, Probability, Statistical distribution, Errors, Programming (Computers), Algorithms.

The Fano sequential decoding algorithm is briefly described. A computer program (FSD) for executing the algorithm on a simulated binary symmetric channel is discussed and certain results obtained with the program are reported. The major results are: good values of the decoding parameters, d (o) and T (o), are found and their adjustment is not critical; the tail of the cumulative distribution function of the number of computations per information bit appears to obey a Pareto law; the behavior of the waiting line in the buffer at the receiver input is predicted by extrapolating on the Pareto behavior of the number of computations. (Author)

AD-413 949 **Field 9D**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A QUALITATIVE DESCRIPTION OF SEQUENTIAL DECODING,
by Irwin L. Lebow. 12 Jul 63, 28p 62G-4
Contract AF 19 (628)-500

Descriptors: (*Coding, Sequential analysis), (*Information theory, Probability), Data storage systems, Data transmission systems, Transmission lines, Distortion, Errors, High frequency, Ionospheric propagation, Attenuation, Absorption, Electrical networks, Radio receivers, Modulators, Correlation techniques, Signal-to-noise ratio, Intelligibility, Signals, Telephone lines.

This report contains a qualitative discussion of sequential decoding directed toward the non-specialist in information theory. Both the Wozencraft and Fano algorithms are included. The description of sequential decoding is preceded by a summary of the general problem of probabilistic coding and decoding. (Author)

AD-421 872 **Field 9D, 17I**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
ASYMPTOTIC BEHAVIOR OF THE SPECTRA OF RF PULSES WITH LINEAR FREQUENCY MODULATION,
by S. L. Borison and D. F. DeLong. 9 Oct 63 29p 41G-5
Contract AF 19 (628)-500, ARPA order-498
N64 17 663

Descriptors: (*Radiofrequency pulses, Frequency modulation), Inequalities, Linear systems, Bandwidth, Frequency, Radar transmitters, Noise (Radar), Radar signals, Density, Linear systems, Complex variables.

The asymptotic spectra of wide-band radio frequency pulses with linear frequency modulation are evaluated. It is specifically shown that at frequencies (measured from the carrier frequency) much larger than the maximum FM deviation the effect of the FM is small. In particular, at a frequency 50 mc higher than the carrier frequency, the envelope of the spectrum of a 10 microsecond rectangular pulse with a 10 mc FM deviation is less than 1% above the envelope of the spectrum of a pulse with no FM. The spectrum of a cosine pulse with these same characteristics is increased by less than 3%. (Author)

AD-422 263 **Field 9D, 17I**
CFSTI Price: HC$4.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
RESPONSE FUNCTIONS OF LINEAR TIME-VARYING SYSTEMS,
by J. C. Lindenlaub. 9 Sep 63, 48p 41G-6
Contract AF 19 (628)-500, ARPA order-498
N64 16 820

Descriptors: (*Information theory, Radar tracking), Communication systems, Linear systems, Wave functions, Radar signals, Differential equations, Time-log theory, Integral transforms, Integration.

Linear time-varying networks are considered from the communication systems viewpoint where the emphasis is primarily on the relationships between the input and output signals. This is the viewpoint taken by the radar or communications engineer who treats the radar target configuration or communication channel as a black box which performs a linear time-dependent transformation on the input signal to yield the output signal. Results may serve as a basis for a number of problems associated with communicating through random time-varying channels; among them, the identification problem, signal design, and optimum processing. (Author)

AD-441 207 **Field 9D, 12A**
CFSTI Price: HC$8.60
Stanford Univ., Calif. Stanford Electronics Labs.
ON STATISTICAL COMMUNICATION THEORY,
by N. Abramson, and J. Farison. Aug 62, 81p
TR-2005-1, SEL-62-078
Contract Nonr-225 (24),
Proj. NR-373-360

Descriptors: (*Information theory, Statistical analysis), Statistical processes, Measurement, Noise generators, Sampling, Noise, Signals, Narrowband, Amplitude modulation, Phase modulation, Stochastic processes, Fourier analysis.

The report is divided into five parts: (1) The Narrow-Band Gaussian Random Process, (2) Measurement Problems, (3) Noise Generation, (4) Modulation by Random Processes, and (5) Wiener Filters and Random Sampling. The results presented in the first three parts are not new; the methods used to obtain these results, however, are new. These particular parts are presented because the methods are considered substantially superior to those given elsewhere. Both new methods of treating problems and new results are given. In particular, results dealing with the spectra of pulsed communication signals and results on sampling of random processes are not known to be published elsewhere. (Author)

AD-441 210 **Field 9D, 12A**
CFSTI Price: HC$8.60
Stanford Univ., Calif. Stanford Electronics Labs.
ON APPLIED DECISION THEORY.
Technical rept.,
by N. Abramson, and J. Farison. Sep 62, 89p
SEL-62-095, TR-2005-2
Contract Nonr-225 (24),
Proj. NR-373-360

Descriptors: (*Information theory, Decision theory), (*Decision theory, Detection), Pattern recognition, Matched filters, Data processing systems, Noise (Radar), Signal-to-noise ratio, Radar signals, Radar interception.

This report is based on material from a Stanford University course (EE 252) on the application of statistical decision theory to signal detection, parameter estimation, and pattern recognition. The report is divided into nine parts: (1) Filters and Noise; (2) Sample Value Representation; (3) Detection of a Known Signal in Noise; (4) General Dual-Hypothesis Test; (5) Signal Detection with Mismatched Filters; (6) Detection of Signals with Random Parameters; (7) Test of a Finite Number of Hypothesis; (8) Estimation; (9) Discrete Wiener Filters. Part One provides a general review of classical methods of signal detection and parameter estimation. The rest of the report deals with the application of statistical decision theory to these problems. (Author)

AD-633 815 **Field 9D, 9C**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
OPTIMIZATION OF A THRESHOLD LEVEL VALUE OF A COMPUTING DEVICE,
by A. M. Bonch-Bruevich. 21 Jan 66, 12p FTD-TT-65-1485
TT 66-61417
Unedited rough draft trans. of Avtomatyka (USSR) n5 p31-5 1964.

Descriptors: (*Information theory, Signal-to-noise ratio), (*Signal-to-noise ratio, Data processing systems), Noise analyzers, Discriminators, Data transmission systems, Errors, Electrical engineering, USSR.

The author considers the question of ensuring a minimum of complete probability of the error of correct detection during receiving of a signal distorted by noise with the aid of a threshold computing device with a regulated threshold level. This problem may be solved on using either a hunting extremal regulator or a regulator with feedback. The two regulators are compared from the standpoint of noiseproof properties. The paper also gives extremal dependences of the performance indicator of the receiving device, from which it follows that with various relations of signal to noise the dependences not only shift but even change their shape. This is a feature of the computing device as a controlled member. (Author)

AD-633 932 **Field 9D, 12A**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
CLOSED FORM OF SOME LINEAR-MIXER POWER SPECTRUM INTEGRALS,
by Paul G. Hershall. 6 Dec 65, 16p TM-65-53
Proj. HDL-39800

Descriptors: (*Information theory, Integrals), (*Integrals, Stochastic processes), Integration, Signal-to-noise ratio, Mixers (Electronics), Linear systems.

Identifiers: Power spectrum.

N66-21351 **Field 9D**
CFSTI Prices: HC$1.00 MF$0.50
Stanford Univ., Calif. Radioscience Lab.
DIGITAL MEASUREMENT OF DIFFERENTIAL TIME DELAY OF PSEUDO RANDOM CODED SIGNALS.
Scientific rept. no. 6,
by P. M. Spira. Jan 66, 19p SEL-65-027
Grant NsG-377
NASA CR-71415

Descriptors: *Digital technique, *Time delay, *Cross correlation, *Pseudorandom signal, *Signal processing.

N66-22252 **Field 9D**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
COMPARISON OF PHASE-COHERENT AND NON-PHASE-COHERENT CODED COMMUNICATIONS,
by T. V. Saliga, and J. P. Strong III. 1965, 40p
NASA-TM-X-56541
Prepared for presentation at the Annual International Space Electronic Symposium (10th), Miami Beach, Fla., 2-4 Nov 1965.

Descriptors: *Coding system, *Mathematical model, *Phase coherence, *Communication system, *Signal to noise ratio.

AD-408 250 **See Field 17B**

AD-410 795 **See Field 17B**

AD-416 647 **See Field 17B**

AD-633 678 **See Field 17B**

AD-633 833 **See Field 17B**

AD-633 851 **See Field 17B**

AD-633 853 **See Field 17B**

AD-633 855 **See Field 17B**

9E. SUBSYSTEMS

AD-402 827 **Field 9E, 20L**
CFSTI Price: HC$1.00
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE SELECTION OF VARACTOR DIODES FOR A 2X MULTIPLIER,
by Donald E. Crook. 18 Mar 63, 22p Rept. no. 36G-5
Contract AF 19 (628)-500

Descriptors: (*Varactor diodes, Frequency multipliers), (*Frequency multipliers, Varactor diodes), Diodes (Semiconductor), Frequency, Voltage, Power, Electrical impedance, Mathematical prediction, Ultrahigh frequency, Super high frequency, Electrical engineering.

A simplified procedure is presented for the selection of varactor diodes in frequency multiplier design. Graphs are presented that enable the circuit designer to select the proper diode to fulfill the design objective. (Author)

AD-406 108 **Field 9E, 17B**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
A NEW METHOD FOR DELAY-MODULATING A PULSE TRAIN,
by Leo I. Bluestein. 28 May 63, 16p 65G-4
Contract AF 19 (628)-500

Descriptors: (*Pulse modulation, Delay circuits), (*Delay circuits, Pulse modulation), (*Frequency modulation, Delay circuits), Trainsistors, Pulse generators, Distortion, Mathematical prediction.

A new circuit for obtaining pulse frequency modulation (which is equivalent to pulse delay modulation) is derived. It is shown that the frequency is continuously variable over a considerable range. A practical implementation of the circuit is shown. Methods of improving the linearity of the deviceare presented. In theory, these techniques can be made to yield a circuit having no non-linearity. (Author)

AD-406 109 **Field 9E, 20N**
CFSTI Price: HC$3.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
EXPERIMENTAL EVALUATION OF A 1000-WAVELENGTH ANTENNA,
by W. D. Fitzgerald, V. L. Lynn, and K. J. Keeping.13 May 63, 37p 46G-4
Contract AF 19 (628)-500

Descriptors: (*Parabolic antennas, Performance (Engineering)), Ranges (Establishments), Millimeter waves, Antenna lobes, Antenna feeds, Antenna masts, Temperature, Measurement, Antenna radiation patterns, Gain, Refraction, Extremely high frequency, Tests, Test facilities, Space communication systems.

A 28-foot diameter antenna, operating at wavelengths of 8.5 mm, was installed and tested. This report describes the evaluation of the test range and the electrical testing of the antenna at a wavelength of 8.5 mm. A series of grain, pattern, and boresight shift measurements was taken to determine the effects of different ambient temperatures, nonuniform solar heating and wind conditions. On a typical daily run, measurements were taken at 1 - 1 1/2 hour intervals beginning before dawn and continuing until the late afternoon. Approximately 15 complete daily runs were made during various weather conditions which included winds up to 25 - 30 mph and ambient temperatures ranging from the mid 30's (degrees F) to the high 80's. (Author)

AD-410 546 **Field 9E, 9B**
CFSTI Price: HC$4.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
POINTING THE LINCOLN LABORATORY BUILDING B ROOF ANTENNA IN REAL TIME USING THE CDC 160-A COMPUTER,
by J. D. Drinan. 29 Jun 63, 47p 62G-3
Contract AF 19 (628)-500
N64 14015

Descriptors: (*Telemetering antennas, Control systems), (*Digital computers, Control systems), Satellites (Artificial), Tracking, Programming (Computers), Data processing systems, Input-output devices.

A computer program has been constructed for the CDC 160-A computer which controls, in real time, the Laboratory's 30-foot telemetry antenna atop Building B in tracking artificial near-earth satellites. The program accepts input orbital parameters and generates new pointing angles (and range) every eight seconds. (Author)

AD-413 473 **Field 9E, 20L**
CFSTI Price: HC$6.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
CHARACTERISTICS AND APPLICATIONS OF SOLID-STATE OPERATIONAL AMPLIFIERS,
by J. N. Harris, and K. E. Perry. 23 Jul 64, 69p 62G-2
Contract AF 19 (628)-500
N64 14016

Descriptors: (*Feedback amplifiers, Transistor amplifiers), (*Transistor amplifiers, Feedback amplifiers), Inverter circuits, Integrator, Differentiating circuits, Detectors, Trigger circuits, Oscillators, Filters (Electromagnetic wave), Gates (Circuits).

Identifiers: Operational amplifiers.

Recent developments in semiconductor components permit the design of operational amplifiers which rival and in some respects exceed the performance of conventional vacuum tuve operational amplifiers. A number of practical designs which have been developed in Group 62 are discussed. A survey is given of some applications which have been used in analog data processing. Both linear and nonlinear feedback elements are considered. (Author)

AD-416 663 **Field 9E, 18H**
CFSTI Price: HC$4.60
Sperry Microwave Electronics Co., Clearwater, Fla.
STUDY OF PULSED RADIATION EFFECTS ON MICROWAVE FERRITE DUPLEXERS.
Quarterly Technical rept. no. 4, 1 Feb-30 Apr 63. 3 0 Apr 63, 50p
Contract DA-36-039-sc-89113,
Task OST-740000528

Descriptors: (*Duplexers (Electronic), Radiation damage), (*Radiation damage, Duplexers (Electronic)), Ferrites, Microwave equipment, C band.

This report presents a summary of data collected to date on the operating characteristics of active microwave duplexing devices in pulsed nuclear radiation fields. Two series of experiments have been performed at the Sandia Pulsed Reactor Facility (SPRF) where the operating characteristics of C-band coaxial ferrite Y-junction circulators, C-band gyromagnetic coupling limiters, C-band coaxial internal magnet isolators, and various types cable have been evaluated.

AD-442 549 **Field 9E, 17I**
CFSTI Price: HC$11.60
General Electric Co., Pittsfield, Mass. Ordnance Dept.
STUDY OF ANTENNA AXIS CONFIGURATIONS FOR SATELLITE TRACKING AND CONTINUED STUDY OF TRANSPORTABLE ANTENNA SYSTEMS.
Quarterly rept. no. 3, 1 Jan-31 Mar 64,
by M. Howe, A. A. Clark, W. Neubert, C. Wales, andW. Quick. 10 Jul 64, 112p
Contract DA-36-039-AMC-03333 (E),
Proj. DA-62230-PM-63-91- (6127)

Descriptors: (*Satellite tracking systems, Antennas), (*Antennas, Satellite tracking systems), Mechanical properties, Mobile, Antenna configurations, Mechanical drawings, Servomechanisms, Drives, Cables (Mechanical), Parabolic antennas, Antenna components, Specifications, Gears, Servomotors, Antenna feeds, Wind, Stability, Supports, Joints, Errors, Torque, Friction, Mechanical engineering.

The preliminary design of a 60-foot differential satellite tracking antenna is covered; advantages and disadvantages are discussed. supported by layouts, diagrams, servo block diagrams and other data. A feasibility study of the full-coverage cable-driven antenna known as ball-joint mount is included. Covered are characteristics, sketches, pictures, servo analysis and other material which describe the advantages and problems of the ball-joint mount. Also included is treatment of power drive design, with the emphasis on low-velocity drives. (Author)

AD-442 879 **Field 9E, 13I**
CFSTI Price: HC$25.80
United Shoe Machinery Corp., Beverly, Mass.
ELECTROMAGNETIC HARMONIC DRIVE LOW INERTIA SERVO ACTUATOR.

Final technical documentary rept., Jan 62-Feb 63,
by D. F. Herdeg, H. W. Proctor, W. B. Spring, G. P. Scott, and G. C. Newton Jr. Dec 63, 262p
Contract AF 33 (657)-7731,
Proj. AF-8225,
Task 822503
ASD TDR-63-466

Descriptors: (*Servomotors, Actuators), (*Actuators, Electromagnetic drives), Servomechanisms, Transistors, Computer logic, Gates (Circuits), Equations, Torque, Models (Simulations), Performance (Engineering), Digital systems, Control systems, Tests, Measurement, Design.

In this research and development project the feasibility of a new type of low inertia electrical servo actuator, designated Electromagnetic Harmonic Drive, is demonstrated. Drastic reduction in inertia, compared to conventional electrical devices, provides for increased power rate, power rate to weight, and power rate to electrical loss characteristics, which are shown to best determine the usefulness of an actuator for fast response, light weight, efficient servo systems. A fundamental analysis is made of the requirements for optimizing these parameters. The relative feasibilities of various electromagnetic configurations for meeting these requirements are discussed in depth. It is shown that two forms of the electromagnetic Harmonic Drive concept offer the most promise. The first is a stepping device which offers all the advantages of digital control systems. It has the higher response capability and is therefore the primary type. The second form is a synchronous device with constant torque output but a somewhat lower response capability. Implications upon electrical control systems, resulting from the advance in performance provided by the new device, are discussed. (Author)

AD-633 478 **Field 9E, 9A, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Chatham Electronics Div., Tung-Sol Electric Inc., Livingston, N. J.
HIGH SPEED POWER AMPLIFIER USING AN ELECTRON SWITCHED P-N JUNCTION.
Quarterly interim development rept. no. 4, 27 Feb-27 May 66,
by Nelson E. Ake. 27 Feb 66, 20p
Contract NObsr-93306
See also AD-628 858.

Descriptors: (*Semiconductors, Power amplifiers), (*Power amplifiers, *Diodes (Semiconductor)), Pulse amplifiers, Leakage (Electrical), Electron guns, Beam power tubes, Performance (Engineering), Degradation, Bonding, Processing, Solid state physics, Semiconductor devices.

One of the latest design planar silicon dioxide passivated diodes has been fabricated into an EBM tube. The diode used in the tube has a reverse breakdown voltage of 900 volts measured at 300 microamps. The reverse leakage current was 8 microamps at 500 volts. The diode maintained its hard characteristics through sealing the heat sink to the envelope and sealing the electron gun to the glass envelope. However, after processing the diode appeared to be electrically shorted. After a current surge in the reverse direction the diode had a reverse voltage breakdown of 150 volts, and after standing over the weekend this voltage breakdown increased to 300 volts. It is planned to investigate further to try to determine the cause of this apparent deterioration during tube processing. Upon further processing of the gun cathode it was discovered that the heater was opened. The reason for this has not been determined and this tube will be dissected and examined after some further experimenting with the diode. (Author)

AD-633 495 **Field 9E**
CFSTI Prices: HC$3.00 MF$0.75
Sylvania Electronic Systems-Central, Williamsville, N. Y.
ELECTRONICALLY STEERABLE ARRAY.
Final rept. 27 Aug-31 Dec 65,
by T. R. Schiller, and W. S. Heath. Apr 66, 5?,
Contract AF 30 (602)-3041,
Proj. AF-4506,
Task 450604
RADC TR-66-16
See also AD-629 543.

Descriptors: (*Phase arrays, Electronic scanners), Scanning, Gain, Millimeter waves, Antenna radiation patterns, Performance (Engineering), Phase shifters, Antenna feeds, Ferromagnetic materials, Antenna apertures.

Identifiers: Ferrites (Electronics).

The report describes the effort to design and build a high gain, electronically steerable, millimeter antenna system. The antenna was constructed, adjusted for optimum performance and an extensive testing program carried out. The tests included measurements of radiation patterns at various scan angles, gain measurements, control power requirements, scan speed, and hysteresis effects. Consideration was also given to average and peak RF power and antenna efficiency. Results indicate that an antenna array of 5 elements is capable of scanning a beam 50 degrees at a rate of one degree per millisecond. The overall efficiency of this array was 60 percent taking into account both the illumination taper and insertion loss in the feed elements. Scanning both the element and array patterns eliminated the grating lobe phenomena normally associated with arrays of many wavelength elements. (Author)

AD-633 570 **Field 9E**
FSTI Prices: HC$3.00 MF$0.75
Ling Electronics, Anaheim, Calif.
DESIGN REPORT 0 TO 25 KILOHERTZ 10 KILOWATT AMPLIFIER.
Final technical rept. 30 Jun 65-24 May 66,
by C. J. Bertrem. 24 May 66, 48p Rept. no. 42664
Contract Nonr-4989 (00),
Proj. NR-374-470

Descriptors: (*Power amplifiers, Very low frequency), (*Transistor amplifiers, Power amplifiers), Design, Broadband, Mechanical drawings, Audio amplifiers, Inverters, Pulse modulation.

The report covers the design of a high efficiency transistor amplifier. The amplifier power output is 10 kW over a frequency range of 0 to 25 kHz. Included is a study of the feasibility of using a high frequency carrier generated by an SCR inverter as an alternate method of high power broad band amplification. The possibility of a switching amplifier approach is also examined. (Author)

AD-633 594 **Field 9E, 12B**
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana. Coordinated Science Lab.
ON THE GENERATION OF DIAGNOSTIC TEST PROCEDURES,
by Wendell J. Bouknight. May 66, 66p Rept. no. R-292
Contract DA-28-043-AMC-00073 (E), Grant NSF-GK-36,
Proj. DA-20014501B31F

Descriptors: (*Combinatorial analysis, *Failure (Electronics)), (*Electrical networks, Test methods), Algorithms.

The problem of generating diagnostic test procedures for combinational logic networks is studied and an algorithm developed that generates test procedures in a form ready to use by a test engineer. The method used to select the input vectors of the test sequence is to choose the 'best' inputs that 'partition' the failures of the network into either single member 'distinguishable' failure classes or 'indistinguishable' failure classes that are 'distinguishable' from the rest of the failures of the network. All knowledge about the behavior of the network is derived from the output results of the test procedures. The algorithm 'simulates' the network to derive the procedures on this basis. (Author)

AD-633 609 **Field 9E, 9B, 12B**
CFSTI Prices: HC$2.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
LAGUERRE FUNCTIONS AND THE LAGUERRE NETWORK: THEIR PROPERTIES AND DIGITAL SIMULATION.
Technical note,
by Charles R. Arnold. 4 May 66, 46p TN-1966-28
Contract AF 19 (628)-5167,
Proj. 627A
ESD TR-66-202

Descriptors: (*Special functions (Mathematical), Input-output devices), Simulation, Digital computers, Electrical networks, Model theory.

This report summarizes the properties of the Laguerre polynomials, the Laguerre functions, and the Laguerre network. Their relationship to system theory is indicated and some typical results from a digital simulation are presented. The theory for the corresponding discretetime network used for the simulation is developed within the report. (Author)

AD-633 728 **Field 9E**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MICROWAVE ANTENNA RELATIVE GAIN MEASUREMENTS IN A PARTIALLY COHERENT FIELD.
Master's thesis,
by Rudolph J. Dichtl. Jun 66, 119p GSP/PH/66-4

Descriptors: (*Slot antennas, Gain), (*Antennas, Microwave frequency), Antenna radiation patterns, S band, Measurement, Statistical functions, Resolution, Antenna aperatures, Radio fields.

Relative gain and resolution measurements of a microwave antenna in a partially coherent field were made. The degree of coherence function for a rectangular aperture incoherent source was also measured. A resonant longitudinal slot array antenna with a center frequency of 2.8 GHz was constructed. The partial coherent microwave field was generated by an incoherent source which consisted of a planar array of commercial fluorescent lamps. A tuned radio frequency (TRF) radiometer was used in conjunction with a lock-in amplifier as a synchronous detection system. The experimentally measured degree of coherence function agreed well with theory. The results of the antenna measurements indicated that only a limited improvement in gain and resolution could be obtained by increasing the aperture dimensions for an antenna in a field of a known degree of partial coherence. (Author)

AD-633 859 **Field 9E, 20N**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Lab., Corona, Calif.
BROAD-BAND VLF TRANSMITTING STAGGER-TUNED DIPOLE,
by E. W. Seeley, and D. A. Wulfing. 18 May 66, 27p NOLC-653

Descriptors: (*Dipole antennas, Very low frequency), Broadband, Electrical impedance, Performance (Engineering), Effectiveness, Ionospheric propagation, Radio transmission.

A moderately efficient, easily constructed, broadband VLF transmitting antenna is needed for ionospheric physics research. A low cost, multiconductor, stagger-tuned horizontal dipole was constructed on the Island of Hawaii. Measurements were made to confirm equations that were derived for the input impedance and efficiency. Theoretical and experimental input impedance

and efficiency curves are presented for the VLF band. Field strength measurements were made at a distance of 42 km and 4000 km from the antenna, using ten different VLF frequencies. Theoretical and experimental radiated field strengths are compared and show fair agreement. (Author)

AD-634 090 **Field 9E, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Technology Div., Library of Congress, Washington, D. C.
MATHEMATICS OF ANTENNAS: ANNOTATED BIBLIOGRAPHY.
ATD work assignment no. 79, Task 12,
by Leonas Kacinskas. 31 Mar 66, 68p ATD-66-33
TT 66-61465
Based on Soviet open sources pub. 1961-64. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Bibliographies, *Antennas), (*Mathematics, Antennas), Theory, USSR.

Identifiers: Applied mathematics.

This annotated bibliography deals with theoretical aspects of antennas. The 199 entries are arranged in alphabetical order by year with the following breakdown: 1961--52 entries, 1962--38 entries, 1963--49 entries, and 1964--60 entries. Other information included: radio wave diffraction determination, pencil-beam antenna, spherical antenna, antenna feeder systems, horn antenna, slot antenna, reflector-type antenna, scanning antenna, electrical beam scanning, directional antenna, aplanatic antennas, circular aperture antenna, plane aperture antenna, antenna loss determination, periscope antenna system, linear antenna, helix-dielectrical antenna, diffraction antenna, dielectric lens antenna, phase center of antennas, and dipole antenna. (Author)

AD-633 560 **See Field 17B**

AD-633 608 **See Field 9C**

AD-633 689 **See Field 13G**

AD-633 695 **See Field 14B**

AD-633 743 **See Field 9A**

AD-633 777 **See Field 9A**

AD-633 850 **See Field 9A**

PB-169 322 **See Field 4B**

9F. TELEMETRY

N66-21819 **Field 9F**
CFSTI Prices: HC$4.39 MF$2.25
Lockheed Missiles and Space Co., Sunnyvale, Calif.
PCM TELEMETRY DATA COMPRESSION STUDY. PHASE I.
Final rept., 15 Sep 64-15 Aug 65,
by W. R. Bechtold, D. R. Weber, and J. E. Medlin. Oct 65, 440p M-62-65-2
Contract NAS5-9729
NASA CR-71528

Descriptors: *Data compressor, *Explorer XVII satellite, *Pulse code modulation (PCM), *Telemetry.

N66-21823 **Field 9F**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
EARTH COVERAGE PATTERNS WITH HIGH-GAIN ANTENNAS ON STATIONARY SATELLITES,
by W. Sollfrey. Feb 66, 40p RM-4894-NASA
Contract NASr-21
NASA CR-71551

Descriptors: *Antenna, *Communications satellite, *Orbiting satellite, *Stationary orbit.

N66-22199 **Field 9F**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
A DEMODULATION SYSTEM FOR VECTOR MEASUREMENTS FROM A SPINNING SATELLITE,
by W. J. Kerwin, and R. Munoz. 1965, 16p
NASA-TM-X-56524
Prepared for presentation at the IEEE Symposium on Signal Transmission and Process., New York, 13-14 May 1965.

Descriptors: *Demodulation, *Magnetometer, *Sensor, *Satellite.

10A. CONVERSION TECHNIQUES

N66-21407 **Field 10A**
CFSTI Prices: HC$1.00 MF$0.50
Vickers, Inc., Torrance, Calif. Aerospace Div.
DEVELOPMENT OF A HYDROGEN-OXYGEN SPACE POWER SUPPLY SYSTEM.
Progress rept. 31 Jul 63,
by W. D. Morath. 1963, 16p PR-91570-510-1
Contract NAS3-2787
NASA CR-71521

Descriptors: *Cylinder, *Hydrogen oxygen (Hope) spacecraft, *Auxiliary power source, *Engineering development, *Injector.

N66-22356 **Field 10A**
CFSTI Prices: HC$7.00 MF$1.75
General Electric Co., Cincinnati, Ohio. Space Power and Propulsion Section.
TWO STAGE POTASSIUM TEST TURBINE.
Quarterly progress rept. no. 17, 8 May-8 Aug 65,
by E. Schnetzer. 24 Nov 65, 305p
Contract NAS5-1143
NASA CR-54897

Descriptors: *Potassium, *Two-stage turbine, *Metal vapor.

10B. POWER SOURCES

AD-453 413 **Field 10B**
CFSTI Price: HC$6.60
Navy Marine Engineering Lab., Annapolis, Md.
THERMOELECTRICITY: REPORT ON THE STATE-OF-THE-ART MATERIALS AND DEVICES.
Research and development rept.,
by C. F. Krolick. Dec 64, 69p MEL-205/64

Descriptors: (*Thermoelectricity, State-of-the-art reviews), (*Electric power production, Thermoelectricity), Shipborne, Power supplies, Thermocouples, Generators, Pumps, Heating.

Identifiers: Theromelectric generators.

AD-633 518 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Minnesota Mining and Mfg. Co., St. Paul, Minn. Thermoelectric Products.
300 WATT PORTABLE THERMOELECTRIC GENERATOR.
Monthly progress rept. no. 14, 30 Apr 66,
by T. L. Nystrom. 30 Apr 66, 4p
Contract N600 (61533)62758
See also AD-631 037

Descriptors: (*Thermoelectricity, Power supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Fuels, Fans, Heaters, Performance (Engineering), Effectiveness.

Identifiers: Thermoelectric generators.

A power unit assembly was fabricated and tested. The weight and performance are consistent with the expected results so the design has been finalized. Several different screen materials were evaluated as covers for the fan assembly to prevent damage to the fan from foreign objects. The burner was tested using regular grade diesel fuel and failed to operate properly. The problem is due to the fact that the preheater is too small. A larger preheater has been designed and is being fabricated. (Author)

AD-633 686 **Field 10B, 7D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
INTERACTION OF CARBON DIOXIDE WITH HYDROGEN CHEMISORBED ON A PLATINUM ELECTRODE.
Interim rept.,
by B. J. Piersma, T. B. Warner, and S. Schuldiner. 26 Apr 66, 14p NRL-6388
Projs. SR-007-12-01-0809, RR-001-01-43-4754

Descriptors: (*Fuel cells, Chemical reactions), (*Electrodes, Chemical reactions), (*Carbon dioxide, Chemical reactions), (*Hydrogen, Chemical reactions), Chemisorption, Platinum, Electrochemistry, Oxidation-reduction reactions, Formic acid, Dissociation.

The effect of CO2 on the oxidation of H atoms chemisorbed on a Pt electrode was examined with potentiostatic and transient galvanostatic techniques. The results indicate that CO2 is not reduced, but that Had oxidation is inhibited by CO2, or possibly HCO3 (-). Under these conditions the inhibited or blocked Had is stable at potentials negative to 0.300 V (vs N.H.E.). Dissociation of HCOOH to Had and CO2 may inhibit the further oxidation of HCOOH by a similar blocking mechanism. (Author)

AD-633 736 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
New York Univ., N. Y. Dept. of Chemistry.
A ROTATING DISC THERMOCELL. II. EXPERIMENTAL.
Technical rept.,
by B. R. Sundheim, and W. Sauerwein. 15 May 66, 20p
Contract Nonr-285 (37),
Proj. NR-051-396

Descriptors: (*Thermoelectricity, *Electrolytic cells), Electrodes, Disks, Rotation, Electrolytes, Heaters, Power, Potassium compounds, Chlorides, Silver, Silver compounds, Chlorides, Turbulence, Laminar flow, Energy conversion.

Identifiers: Potassium chloride, Rotating disc electrodes, Silver chloride, Thermoelectric generators.

A thermocell consisting of a rotating disc electrode and another wire electrode in an electrolytic solution is described. The temperature difference is produced by mounting a heater inside the rotating disc electrode while the temperature of the bulk solution is kept constant at a mean temperature of 21IC. The change of the thermoelectric power for 0.1 and 1.0 N aqueous KC1 solution with Ag/AgCl electrodes was independent of the speed of rotation below 375-400 rpm (laminar flow range). At speeds > 400 rpm the thermoelectric power values became dependent on the rotation speed, presumably because of increasing turbulence of the liquid. In the laminar flow range the mean values were 185 microvolts/deg and 250 microvolts/deg for 1.0 N and 0.1 N aqueous KC1 solutions, respectively. (Author)

AD-633 963 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.

ELECTROSTATIC AND ELECTROMAGNETIC GENERATORS: ANNOTATED BIBLIOGRAPHY.
Rept. no. 2 on ATD work assignment no. 51,
by Jordan V. Randjelovic. 14 Jan 66, 23p ATD-66-10
TT 66-61444
Based on Soviet open sources pub. 1961-64. Rept. on Surveys of Soviet Scientific and Technical Literature.

Descriptors: (*Bibliographies, *Electrostatic generators), (*Generators, Bibliographies), USSR.

The 72 entries are arranged by institute. Arrangement within the institutes is alphabetical by author. The bibliography covers the period of 1961 through 1964 and is based on transactions presently available at the Library of Congress. The institutes are as follows: Institute of Power and Electrical Engineering, Latvian Academy of Sciences; Leningrad Polytechnic Institute imeni M. I. Kalinin; Moscow Aviation Institute imeni Sergo Ordzhonikidze; Moscow Power Institute; and Ural Polytechnic Institute imeni S. M. Kirov. (Author)

AD-634 077 **Field 10B**
CFSTI Prices: HC$4.00 MF$0.75
Union Carbide Corp., Parma Ohio. Research Lab.
THIN FUEL CELL ELECTRODES.
Final rept. no. 8, 1 May 65-30 Apr 66,
by M. B. Clark, and K. V. Kordesch. Jun 66, 121p
Contract DA-28-043-AMC-01344 (E),
Proj. DA-1C6-22001-A-053,
Task 04
ECOM 01344-F
Contract DA-36-039-AMC-02314 (E), cont. See also AD-631 368.

Descriptors: (*Electrodes, *Fuel cells), Hydrogen, Life expectancy, Electrolytes, Batteries ; components.

Fifteen, 100-watt (nominal), hydrogen-air batteries were built and subjected to various load and environmental conditions. The results now allow us to predict the performance and life expectancy of such batteries. Current densities as high as 100-ASF continuous loading could be supported without electrode damage. Of particular interest was the study of the interdependence of air humidity, gas flow rates, temperature, electrolyte concentration, and current density. The effects of incomplete-CO_2 removal from the air, the differences between KOH and NaOH as electrolyte, and the characteristics of oxygen and air operation were determined. Optimum steady-state conditions for longest life were outlined, and it was shown that this type of battery is capable of extended operation with a minimum of maintenance. The uniformity of multicell batteries was carefully checked, and is discussed in detail. (Author)

AD-634 078 **Field 10B**
CFSTI Prices: HC$6.00 MF$1.50
Process Research Div., Esso Research and Engineering Co., Linden, N. J.
HYDROCARBON-AIR FUEL CELL.
Semiannual rept. no. 4, 1 Jul-31 Dec 65,
by Carl E. Heath, Hugh H. Horowitz, Barry L. Tarmy, Charles E. Morrell, and James A. Wilson. Jun 66, 272p PcRD-2MRG-66, Rept. no. 8
Contract DA-36-039-AMC-03743 (E), ARPA Order-247

Descriptors: (*Fuel cells, Electrochemistry), Electrodes, Hydrocarbons, Catalysis, Adsorption.

Work on the direct hydrocarbon electrode has continued to concentrate on studies of mechanism, catalysis and structure, aimed at improving the utilization of platinum or finding non-noble substitutes for it. Butane adsorption measurements were also made in phosphoric acid at 140 degrees to determine whether the higher temperatures might not lead to stronger adsorption. It was found that adsorbed butane did cover a higher fraction of the sites available to hydrogen at the higher temperature.

AD-634 098 **Field 10B, 20I, 9C**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
ELECTRICAL CHARACTERISTICS OF THE LINEAR HALL AND FARADAY GENERATORS AT SMALL HALL PARAMETERS.
Technical information series,
by B. Zauderer. Jun 66, 38p R66SD33
Prepared for presentation at the Symposium on Engineering Aspects of MHD (7th), Princeton University, Princeton, N. J., March 30 - April 1, 1966.

Descriptors: (*Magnetohydrodynamic generators, Linear systems), Xenon, Ionization, Shock waves, Magnetohydrodynamics, Hall effect, Plasma physics, Electrical engineering, Electric power production.

Experiments were performed to determine the electrical characteristics of the linear, segmented electrode, Hall and Faraday MHD generators. The generator working fluid was shock heated Xenon at 7000K gas temperature, one atmosphere pressure, equilibrium conductivity of 850 Mhos/m, and a Hall parameter which ranged in value from 0.7 to 2.5. The study was performed with and without magnetically-induced ionization effects in the generator. If the electrode voltage losses were included in the data analyses, the Faraday generator load characteristics were in agreement with the theory of Hurwitz, Kilb, and Sutton. If the voltage losses at the Hall current electrodes were included in the data analyses, the Hall generator load characteristics obtained under equilibrium plasma conditions were in agreement with the theory of Dzung. In the presence of magnetically induced ionization, the open circuit Hall voltage and the Hall load characteristics were on the average 30% and 10% respectively below the theoretically predicted values. The Hall output reduction is attributed to plasma nonuniformities caused by gas dynamic forces, Lorentz forces and non-uniform extra-thermal ionization effects. However, it was not possible to determine from the present experiments which of these three loss mechanisms was dominant. (Author)

AD-634 103 **Field 10B**
CFSTI Prices: HC$1.00 MF$0.50
Minnesota Mining and Mfg. Co., St. Paul, Minn. Thermoelectric Products.
300 WATT PORTABLE THERMOELECTRIC GENERATOR.
Monthly progress rept. no. 15, 31 May 66,
by T. L. Nystrom. 31 May 66, 4p
Contract N600 (61533)62758

Descriptors: (*Thermoelectricity, Power supplies), (*Generators, Thermoelectricity), (*Electric power production, Thermoelectricity), Portable, Performance (Engineering).

Identifiers: Thermoelectric generators.

The second of the two final power unit assemblies was fabricated and tested. The weight and performance of this unit was as expected. A burner system incorporating a larger wick preheater and a larger vaporizer coil was fabricated and tested. These changes resulted in significantly improved burner performance so that the burner design was finalized. All of the component parts for the two generator systems were ordered and received or are being fabricated. (Author)

N66-21810 **Field 10B**
CFSTI Prices: HC$2.00 MF$0.50
Vickers, Inc., Torrance, Calif. Aerospace Div.
DEVELOPMENT OF A HYDROGEN-OXYGEN SPACE POWER SUPPLY SYSTEM.
Progress rept. for 1-30 Sep 63,
by W. D. Morath. 1963, 38p PR-91570-510-3
Contract NAS3-2787
NASA CR-71517

Descriptors: *Engine testing, *Power supply, *Auxiliary power source.

N66-21811 **Field 10B**
CFSTI Prices: HC$2.00 MF$0.50
Vickers, Inc., Torrance, Calif. Aerospace Div.
DEVELOPMENT OF A HYDROGEN-OXYGEN SPACE POWER SUPPLY SYSTEM.
Progress rept. for 1-31 Oct 63,
by W. D. Morath. 1963, 38p PR-91570-510-4
Contract NAS3-2787
NASA CR-71518

Descriptors: *Engine testing, *Power supply, *Auxiliary power source.

N66-21812 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.50
Vickers, Inc., Torrance, Calif. Aerospace Div.
DEVELOPMENT OF A HYDROGEN-OXYGEN SPACE POWER SUPPLY SYSTEM.
Progress rept. for 1-31 Dec 63,
by W. D. Morath. 1964, 51p PR-91570-510-6
Contract NAS3-2787
NASA CR-71519

Descriptors: *Power generator, *Auxiliary power source, *Hydrogen peroxide, *Power supply.

N66-21813 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Vickers, Inc., Torrance, Calif. Aerospace Div.
DEVELOPMENT OF A HYDROGEN-OXYGEN SPACE POWER SUPPLY SYSTEM.
Progress rept. for 1-30 Nov 63,
by W. D. Morath. 1963, 65p PR-91570-510-5
Contract NAS3-2787
NASA CR-71520

Descriptors: *Hydrogen peroxide, *Power supply, *Auxiliary power source, *Power generator.

N66-22207 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT OF AN ELECTROCHEMICAL ENERGY SOURCE FOR THE MARINER II SPACECRAFT,
by C. W. Brooke Jr. 15 Mar 66, 61p JPL-TR-32-854
Contract NAS7-100
NASA CR-71772

Descriptors: *Electrochemical cell, *Mariner II space probe, *Silver-zinc battery.

N66-22326 **Field 10B**
CFSTI Prices: HC$3.00 MF$0.75
TRW Equipment Labs., Cleveland, Ohio.
5 KW PULSE WIDTH MODULATED STATIC INVERTER,
by W. V. Peterson, and R. J. Resch. 1 Dec 65, 78p TRW-ER-6809
Contract NAS3-6475
NASA CR-54872

Descriptors: *Logic circuit, *Pulse width modulation (PWM).

N66-22349 **Field 10B**
CFSTI Prices: HC$4.00 MF$1.00
TRW Equipment Labs., Cleveland, Ohio.
MATERIALS MANUAL FOR USE WITH TRW SPACE RADIATOR-CONDENSER DESIGN AND PERFORMANCE ANALYSIS COMPUTER PROGRAMS.
Feb 66, 133p ER-6756
Contract NAS9-4884
NASA CR-65330

Descriptors: *Condenser radiator, *Power generator, *Space radiator, *Thermophysical property, *Working fluid.

AD-633 850 See Field 9A

10C. ENERGY STORAGE

AD-460 165 **Field 10C**
CFSTI Prices: HC$4.60
Eagle-Pucher Co., Joplin, Mo.
INVESTIGATIONS LEADING TO THE DESIGN OF A RELIABLE SEALED NICKEL-CADMIUM CELL.
Final rept. no. 8, 1 May 63-30 Apr 64.
30 Apr 64, 48p
Contract DA-36-039-AMC-00135 (E)
Continuation of Contract DA-36-039-sc-89084.

Descriptors: (*Alkaline cells, Design), (*Nickel, Alkaline cells), (*Cadmium, Alkaline cells), Reliability, Electrolytes, Life expectancy, Experimental design, Analysis of variance, Potassium compounds, Hydroxides, Concentration (Chemistry), Lithium compounds, Battery separators, Statistical tests, Electrical discharges, Combinatorial analysis, Experimental data.

Identifiers: Lithium hydroxide, Nickel-cadmium cells, Potassium hydroxide.

The purpose of the study was that of yielding an improved nickel-cadmium cell. Cycle life tests followed the factorial design for main effects (27 cells) as delineated in AD-437 530. The data were analyzed by the Analysis of Variance and yielded these significant effects: Negative linear trend with increasing KOH concentration; type separator; type negative; 80% LiOH as additive. Self-discharge studies followed the factorial design for main effects (16 cells) as delineated in AD-600 251. The data were analyzed by the 't' test and by the half-normal plot. These are the significant effects: Positive linear trend with increasing KOH concentration; type negative. Charge acceptance evaluation followed the same factorial design (16 cells) as that used in the two above experiments. Several analyses were carried out but no adequate representation of the data was found nor were any effects judged real. Overcharge acceptance evaluation followed the same factorial design (16 cells) as that used in the above experiments. Several analyses were carried out but no adequate representation of the data was found nor were any effects judged real.

AD-461 644 **Field 10C**
CFSTI Price: HC$3.60
Livingston Electronic Corp., Montgomeryville, Pa.
LIQUID AMMONIA BATTERIES.
Monthly progress rept. no. 4, Dec 64.
15 Dec 65, 38p
Contract DA-28-017-AMC-1542 (A)
N65 33196
See also AD-462 949.

Descriptors: (*Primary cells, Ammonia), (*Ammonia, Primary cells), (*Batteries+, components, Ammonia), Combinatorial analysis, Performance (Engineering), Reliability, Battery separators, Materials, Oxidizers, Packaging, Test equipment.

Identifiers: Ammonia-activated batteries.

The purpose of the program is to design and develop Primary Reserve Automatically Activated Batteries of three separate types. For purposes of identification, these three batteries have been designated as Units A, B, and C, each having a separate set of specifications. These batteries are based on a liquid-activated system and are to be structurally composed of a cell compartment and an ammonia storage reservoir. Testing was continued on the 'A' battery utilizing the wrap cell approach resulting in performance data showing attainment of goals on a single cell basis. Continued evaluation of the MPR separator material showed accomplishment of electrical specifications for the 'B' battery on a single cell basis at low temperature. A number of oxidant materials were examined with respect to possible increased efficiencies. All activator hardware designs were fabricated for use in adapting cell packages to the geometric limitations of the hardware assembly design. Expendable test chambers were fabricated and employed for the first time with success. Attempts to stabilize 'C' battery stack performance and activation time using a newly devised test set-up was carried out.

AD-462 949 **Field 10C**
CFSTI Pric: HC$4.60
Livingston Electronic Corp., Montgomeryville, Pa.
LIQUID AMMONIA BATTERIES.
Monthly progress rept. no. 3, Nov 64.
15 Dec 64, 50p
Contract DA-28-017-AMC-1542 (A)
N65 33245
See also AD-461 008.

Descriptors: (*Primary cells, Ammonia), (*Ammonia, Primary cells), (*Batteries + components, Ammonia), Combinatorial analysis, Cathodes (Electrolytic cells), Materials, Performance (Engineering), Reliability.

Identifiers: Ammonia-activated batteries.

The purpose of the program is to design and develop Primary Reserve Automatically Activated Batteries of three separate types. For purposes of identification, these three batteries have been designated as Units A, B, and C, each having a separate set of specifications. A continuation of efforts to increase cathodic efficiency in the A battery cell lead to the development of a wrap cell geometry which resulted in an output of 1.90 watt hours/cu.in. This represented some degree of improvement over the previously recorded peak for this material combination (1.47 WH/cu.in.). The first successful single cell performance after a prolonged activated stand was observed in connection with the use of a recently examined separator material. This performance overshot design goals considerably and shows decided promise for incorporation into the B battery design. Major improvements were made in the activator design for the A battery with respect to the ammonia transfer mechanism. This modification involves a modified bellows principle and has to date shown increased efficiency of operation and a high degree of reliability. Full stack cell assemblies were tested in the C battery design employing both single and double cathodes. Performance specifications were met at all temperature levels. (Author)

AD-633 957 **Field 10C, 16D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., Corona, Calif.
CHEMOELECTRIC ENERGY CONVERSION FOR NONAQUEOUS RESERVE BATTERIES.
Quarterly rept. no. 11, Jan-Mar 66,
by R. E. Panzer, G. E. McWilliams, andW. S. Harris. 15 Apr 66, 20p
Tasks RRRE-06-017/211-1F009-06-05, R360-FR-104/211-1/R011-01-01
NAVWEPS 8853
See also AD-628 999.

Descriptors: (*Guided missile batteries, Electrochemistry), (*Wet cells, Electrochemistry), (*Storage batteries, Electrochemistry), Batteries + components, Electrodes, Nitrides, Cyanides, Amides, Organic nitrogen compounds, Ammonia, Battery separators, Oxidation-reduction reactions, Fuel cells, Sulfur, Solutions, Lithium, Cathodes (Electrolytic cell), Conductivity, Chlorides, Ammonium compounds, Thiocyanates.

Although cyanamide may be useful as an acid for organic nitro compounds in a voltaic cell, the advantages sought are insufficient to warrant further effort at this time. Metal nitride reference electrodes were tested in hardware-cell assemblies, but no suitable electrolyte separator has yet been devised to permit reproducible and stable operation. A study was begun of limiting potentials for redox reactions in NH3 electrolytes on various electronically conducting substrates (cathectors), such as Pt, Ag, Ni, stainless steel, and pyrolytic graphite. Tests also began on several types of porous conductive cathector matrices. Study began on soluble fuel-cell reactants, such as solutions of sulfur and organic nitro compounds in anhydrous ammonia. A Li-S fuel cell could be made with both electrode reactants in solution. This cell has a high theoretical enersity of 11 J/mg, as compared with 12 J/mg for the H2-O2 fuel-cell couple (both exceed 1000 Wh/1b). Preliminary coulometric reduction of S in concentrated NaSCN-NH3 solution showed the expected two-electron total reaction occurred at low rate. Cyclic voltammetric measurements of reduction potentials of S solutions on Hg or Pt surface have been satisfactory, because of interfering reactions. (Author)

AD-634 100 **Field 10C**
CFSTI Prices: HC$1.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
LOW-COST, HIGH-ENERGY CATHODES FOR MAGNESIUM PERCHLORATE BATTERIES.
Technical rept.,
by Achille L. Almerini. Apr 66. 22p ECOM-2694
Proj. DA-1C6-22001-A-053,
Task 1C6-22001-A-053-02

Descriptors: (*Cathodes (Electrolytic cell), *Storage batteries), Magnesium compounds, Perchlorates, Manganese compounds, Dioxides, Nitrobenzenes, Costs, Polarization.

Identifiers: Dinitro benzenes, Manganese dioxide, Magnesium perchlorate.

Mercuric oxide cathodes on expanded silver grids have proven their effectiveness in magnesium/magnesium perchlorate reserve type batteries. However, high cost and the critical category of both mercury and silver compounds led to investigations on establishing a low-cost, high-energy depolarizer on an inexpensive grid to replace the mercuric oxide on silver cathode. The report presents findings and preliminary room temperature discharge data at a medium (two-hour) rate primarily for three materials: manganese dioxide, cupric oxide and meta-dinitrobenzene. Data is also presented on various halide depolarizers which did not prove to be nearly as promising. It appears that especially m-dinitrobenzene and manganese dioxide can be developed to the point where they will surpass the performance of mercuric oxide in practical cells. This, coupled with their low cost, would make possible the development of a much needed, inexpensive, highly efficient expendable battery for operation from -40F to +125F for modern communication applications. (Author)

N66-21663 **Field 10C**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept. of Chemical Engineering.
CALORIMETRIC STUDY OF THE THERMODYNAMIC PROPERTIES OF THE NICKEL-CADMIUM CELL.
Final rept., 1 Oct 64-31 Dec 65,
by P. F. Bruins, S. M. Caulder, and A. J. Salkind. 1966, 47p
Grant NGR-33-006-015
NASA CR-71408

Descriptors: *Calorimetry, *Thermal property, *Electrochemical cell, *Nickel-cadmium battery.

N66-22357 **Field 10C**
CFSTI Prices: HC$2.00 MF$0.50
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.

PROGRAM TO DEVELOP AN INORGANIC SEPARATOR FOR A HIGH TEMPERATURE SILVER-ZINC BATTERY.
Quarterly progress rept., 29 Oct 65-29 Jan 66,
by F. C. Arrance, A. Himy, C. Berger, and A. D. Taylor. Mar 66, 48p SM-48461-Q2
Contract NAS3-7639
NASA CR-54919

Descriptors: *Mechanical property, *Phenylene, *Separator, *Silver-zinc battery, *Component reliability.

11A. ADHESIVES AND SEALS

AD-633 895 **Field 11A, 13E**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
TIGHTENING FLANGE JOINTS BY MEANS OF HERMETICALLY SEALING PLASTIC,
by Yu. V. Razdrogin. 1966, 5p Translation-2095
TT 66-61431
Uplotnenie Flantsevykh Soedinenii s Pomoshchyu Germetiziruyushchei Plastmassy, trans. of Sudostroenie (USSR) n6 p76-7 1965.

Descriptors: (*Plastic seals, *Joints), Flanges, Hermetic seals, Epoxy plastics, Bolted joints, Metal joints, USSR, Effectiveness.

Unusual watertightness of flange joints is obtained by placing a suitable packing between the tightening flanges. Additional adjusting work in assembling flange joints may be avoided by using a special binding plastic deposited on the tightening surfaces of the flanges which fills all the micro- and macro-irregularities when tightening the flanges with the joining bolts. Under such conditions the plastic must be self hardening. The indicated requirements are met by hermetically sealing plastic based on an epoxy resin Mark ED-5 (TU LSNKh No. 33029-59) and an epoxy putty mark EPOOIO (GOST 10277-62). Polyethylenepolyamin (VTU MKhP No. P-10-57) serves as the hardening agent, portland cement 500 (GOST 965-41) and chopped glass fiber (VTU No. 836-60) as fillers. A hermetically sealing plastic is resistant to vibration and impact loads, and to oil and gasoline and as a consequence of its insignificant shrinking it maintains relatively stable condition of the joined flanges.

N66-22347 **Field 11A**
CFSTI Prices: HC$6.00 MF$1.25
Pratt and Whitney Aircraft, East Hartford, Conn.
DEVELOPMENT OF COMPRESSOR END SEALS STATOR INTERSTAGE SEALS, AND STATOR PIVOT SEALS IN AIR BREATHING PROPULSION SYSTEMS.
Semiannual rept. no. 1, 29 Jun-31 Dec 65,
by R. M. Hawkins, and C. A. Knapp. 20 Jan 66, 213p PWA-2752
Contract NAS3-7605
NASA CR-54625

Descriptors: *Axial flow compressor, *Sealing, *Propulsion system.

11B. CERAMICS, REFRACTORIES, AND GLASSES

AD-417 368 **Field 11B, 20L, 7B**
CFSTI Price: HC$4.60
Polytechnic Inst. of Brooklyn, N. Y.
INVESTIGATION OF THE STRUCTURES AND PROPERTIES OF SELECTED REFRACTORY BORIDES.
Final rept.
Aug 63, 48p
Contract Nonr-839 (12),
Proj. NR-032-414

Descriptors: (*Refractory materials, Borides), (*Borides, Physical properties), Crystal substructure, Titanium compounds, Electrons, Distribution, Atomic properties, Electrical properties, Phase studies, Synthesis (Chemistry), X-ray diffraction analysis, Aluminum compounds, Titanium compounds, Ytterbium compounds, Rare earth compounds, Manganese compounds, Boron compounds.

Identifiers: Titanium diboride.

Research studies has as their general objective the investigation of the structures and properties of selected refractory borides. A major effort was devoted to the investigation of electron distribution and atomic thermal motions in titanium diboride in order to check on various types of electron transfer between boron and metal atoms which were postulated to account for the electrical and related properties of this compound. Other efforts were directed at the synthesis of related groups of boride phases, the determination of their crystal structures, and the investigation of their properties. (Author)

AD-633 472 **Field 11B, 14B, 11D**
CFSTI Prices: HC$2.60 MF$0.50
Watertown Arsenal Labs., Mass.
MECHANICAL TESTS. DEVELOPMENT OF A STANDARD BEND TEST FOR CEMENTED CARBIDES,
by Alden M. Burghardt, and Alexander S. Elder.
15 Feb 50, 28p WAL-110/16
Proj. TB4-70F

Descriptors: (*Deformation, Test methods), (*Carbides, Deformation), Standards, Tests, Loading (Mechanics), Fracture (Mechanics), Stresses, Rods, Ductility, Rectangular bodies, Bonding, Composite materials.

Load-deflection data from single or double point loaded specimens can be used to determine the fracture stress and Young's modulus of cemented carbides provided the proper geometry of specimen and fixture dimensions are selected and elastic behavior is maintained. The fracture stress of standard double point loaded specimens that plastically deform prior to fracture may be computed by a method outlined by Nadai. A double point loading procedure subjects a considerable area of the specimen to the maximum tensile stress and thereby provides a better indication of metal quality with respect to flaws and a more sensitive means of detecting plastic yielding than a single point loading method. A bar 0.300 in. wide, 0.150 in. thick, and 2.0 in long has been found to be satisfactory as a standard cemented carbide bend specimen when it is supported over a span of 1.5 in. and double point loads are applied by two pins spaced 0.50 in. apart. The two loads applied by the double point loading fixture are of equal magnitude and one is located 0.5 in. from each support. (Author)

AD-633 611 **Field 11B, 20M**
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Philadelphia, Pa. Missile and Space Div.
THE VAPORIZATION OF PYROLYTIC GRAPHITE.
Technical information series,
by P. D. Zavitsanos. May 66, 39p R66SD31
Contract AF 04 (694)-222

Descriptors: (*Pyrolytic graphite, Vaporization), Vapor pressure, Mass spectrometry, Balances, Measurement, Heat of sublimation.

The vaporization of pyrolytic graphite was studied by the Knudsen effusion and Langmuir free vaporization techniques using a microbalance and a time-of-flight mass spectrometer. Vapor pressures were obtained in the temperature range 2417K - 2700K for C, C sub 2, and C sub 3; respective heats of vaporization were calculated by the third-law method. Langmuir vaporization measurements were carried out in the temperature range 2250K - 2760K. The ratios of vaporization coefficients obtained from mass spectroscopic measurements are: alpha sub 2/alpha sub 1 = 2.1, alpha sub 1/alpha sub 3 = 10.6. Use of vapor pressure data and vaporization rates was made to arrive at an overall vaporization coefficient equal to 0.095 and individual values of alpha sub 1 = 0.24, alpha sub 2 = 0.50 and alpha sub 3 = 0.023. (Author)

AD-634 074 **Field 11B, 11D, 13C**
CFSTI Prices: HC$3.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
ENGINEERING PROPERTIES OF SHOTCRETE.
Technical rept. 1 Jul 64-30 Jun 65,
by William R. Lorman. May 66, 55p TR-R-429
Proj. Y-F020-02-01-001

Descriptors: (*Concrete, Structural properties), Pneumatic devices, Construction, Mechanical properties, Panels (Structural).

Identifiers: Shotcrete.

The important technical information gleaned from a literature survey covering the past 55 years of laboratory and field experiences with mortars and concretes applied pneumatically (i.e., shotcrete) is presented. In addition to general facts concerning this method of construction, various physical properties of hardened shotcrete, which have been investigated by numerous researchers, are discussed. Insofar as strength and elasticity are concerned, hardened shotcrete generally is quite similar to hardened mortar or concrete made in the conventional manner and fully compacted. An experimental program is recommended for (1) developing supplementary data with regard to density, elasticity, and strength (bond, compressive, and flexural) of hardened shotcretes (premixed wet) made with 3/4-inch as well as 3/8-inch maximum-size aggregate, and (2) ascertaining whether or not comparatively small prismatic test specimens truly represent the engineering properties of hardened shotcrete in large wall panels. (Author)

C13.29/2:2 **Field 11B, 13C**
CFSTI Price: MF$0.50
National Bureau of Standards, Washington, D. C. Building Research Div.
INTERRELATIONS BETWEEN CEMENT AND CONCRETE PROPERTIES. PART I. MATERIALS, TECHNIQUES, WATER REQUIREMENTS AND TRACE ELEMENTS.
Building Science Series,
by R. L. Blaine, H. T. Arni, and B. E. Foster. 20 Aug 65, 44p BSS-2
Availability: Hard copy available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.35.

Descriptors: (*Cements, Physical properties), (*Concrete, Physical properties), Data, Statistical analysis, Water, Chemical analysis, Mixtures.

The studies of the interrelations between cement and concrete properties are presented in a series of related articles. This first section presents the type classification of the cements and the areas from which they were procured together with the tests performed on the cements and concretes. Also presented are the methods employed in the statistical treatment of the data and a discussion of the significance of the various statistical techniques employed in the following sections dealing with specific aspects of the interrelations between cement and concrete properties. (Author)

N66-22255 **Field 11B**
CFSTI Prices: HC$3.00 MF$0.75
General Electric Co., Philadelphia, Pa. Missile and Space Div.
THE OXIDATION AND SUBLIMATION OF GRAPHITE IN SIMULATED RE-ENTRY ENVIRONMENTS,
by N. S. Diaconis, J. W. Metzger, and M. J. Engel. 1965, 91p
Contracts SNPC-10, AF 04 (694)-222
NASA CR-60395
Prepared for presentation at the Annual Meeting of Heat Transfer and Fluid Mech. Inst. (18th), Los Angeles, 21-23 Jun 1965.

Descriptors: *Temperature effect, *Environment simulation, *Graphite, *Oxidation, *Sublimation.

PB-169 892 **Field 11B**
CFSTI Prices: HC$8.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE DU FRITTAGE D L'ALUMINE FINEMENT DEVISEE (Contribution to the Study of the Sintering of Finely Divided Alumina).
Doctoral thesis in French,
by Pierre Vergnon. 1966, 82p CEA-R-2911
Text in French; Attached Summary in English.

Descriptors: (*Ceramic materials, Sintering), (*Sintering, Aluminum compounds), (*Aluminum compounds, Oxides), Poliders, Particle size, Deformation, Dialometers, Refractometers, Thermal properties, Porosity, Crystal growth, Refractory materials, France.

Identifiers: Aluminum oxides.

Two crystalline forms of alumina, delta and alpha, were used to prepare compacts. The shrinkage of these compacts was investigated at different temperatures. The samples of alumina are composed of non porous, spherical particles, of a very high purity. Their mean diameter varies between 160 and 1,200A for the delta alumina samples and between 400 and 1,200A for the alpha alumina samples. It is shown that the heating rate influences the shrinkage of the compacts when they are heated at temperatures over 1000C. The kinetics of the isothermal shrinkage, at temperatures between 1,000C and 1,600C were thoroughly studied. Values of the apparent activation energy for the different classes of compacts are given. An interpretation of the results is proposed. It takes into account two different but interdependent mechanisms of sintering: the disappearance of porosity as a result of vacancy diffusion and the grain growth as a result of boundary migration. (Author)

PB-170 367 **Field 11B, 14B, 13B, 13C**
CFSTI Prices: HC$2.00 MF$0.50
Virginia Council of Highway Investigation and Research, Charlottesville.
EVALUATION OF LABORATORY EQUIPMENT FOR FREEZING AND THAWING OF CONCRETE,
by Howard H. Newlon Jr., and K. H. McGhee.
Jan 66, 35p 0291
Prepared in cooperation with Bureau of Public Roads, Washington, D. CA

Descriptors: (*Roads, Materials), (*Concrete, Test equipment), (*Test equipment, Concrete), Construction, Freezing, Melting, Laboratory equipment, Performance (Engineering), Ceramic materials, Failure (Mechanics).

Identifiers: Aggregates (Materials), Highway engineering.

The objectives of this study were: (1) To determine the ability of the equipment to estimate the performance of concrete, and (2) To determine the potential application for rapid freezing and thawing tests of aggregate. (Equipment found suitable only for freezing and thawing tests of concrete and aggregate in concrete). The equipment is a commercial automatic freezer similar to that used in a number of laboratories. Concrete for test was prepared with various materials, air contents and proportions. Some of the conclusions of these tests are as follows: (1) The apparatus is capable of a reproducible cycle meeting the requirements of ASTM C 291. (2) Use of equipment in accordance with ASTM C 290 can result in damage to both specimen and containers. (3) Mechanically, the performance of the equipment was excellent. (4) Tests conducted with this equipment classified concrete consistent with service record. (5) The apparatus gives excellent estimates of sensitivity of aggregate to freezing and thawing. (6) Concrete without air fails after 10-20 cycles. (7) Limits for terminating the test set in ASTM C 291 are satisfactory. (Author)

AD-633 601 **See Field 11F**

AD-633 886 **See Field 11F**

AD-633 925 **See Field 11F**

AD-633 986 **See Field 11F**

IS-1287 **See Field 20B**

PB-169 741 **See Field 5C**

PB-170 330 **See Field 5C**

PB-170 331 **See Field 5C**

PB-170 549 **See Field 20B**

11C. COATINGS, COLORANTS, AND FINISHES

AD-633 897 **Field 11C, 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
A PRIMER FOR PROTECTING METAL WHICH HAS BEEN CLEANED AGAINST CORROSION,
by E. V. Iskra, and G. M. Sokolov. 1966, 11p
Translation-2132
Grunt dlya Zaschity Oshishchennogo Metalla ot Korrozii, trans. of Sudostroenie (USSR) n12 p65-9 1965.

Descriptors: (*Coatings, *Corrosion inhibition), Paint primers, USSR, Tannic acids, Rubber, Rubber coatings, Compatibility, Films, Metals, Protective treatments.

Results of the tests conducted make it possible to establish the following. When a clean steel surface is treated with a tannic acid solution a film of iron tannate forms on the surface and has passivating properties. It was established that the iron tannate films had little resistance to water, and that, under the effects of atmospheric precipitation, they were quickly destroyed. It was therefore impossible to use this passivation method on metal and structures stored in the open air. The development of the passivating compound KRT-1, the basis of which is latex and tannic acid compounds, provides the metal with protection against corrosion for from 12 to 14 months. The properties of its films were studied and the technology of using the solution in shipbuilding is suggested. It was proven that the presence of the KRT-1 film on the surface of the metal had no negative effects on subsequent painting. It was established that the KRT-1 film had no effect on the quality of welding operations and that it was not necessary to take any special measures by way of precaution when doing such work on surfaces coated with KRT-1 films. (Author)

AD-633 938 **Field 11C, 13J**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
PLASTIC COATINGS FOR TANKERS,
by M. G. Avrikh. 1965, 3p Translation-2097
Plasmassovye Pokrytiya - Tankeram, Trans. of Sudostroenie, (USSR), n6 p84-5 1965.

Descriptors: (*Plastic coatings, Tankers), (*Tankers, Plastic coatings), (*Thermal insulation, Plastic coatings), Epoxy plastics, Expanded plastics, Symposia, USSR, Petroleum, Foams, Containers, Tanks (Containers).

A report on the scientific-technical conference in Leningrad which was concerned with the question of the use of protective and thermoinsulation coatings when transporting and storing petroleum products.

AD-462 148 **See Field 11J**

AD-633 670 **See Field 20I**

AD-633 944 **See Field 19C**

AD-633 986 **See Field 11F**

AD-634 076 **See Field 13H**

PB-170 362 **See Field 13B**

PB-170 363 **See Field 13B**

PB-170 364 **See Field 13B**

11D. COMPOSITE MATERIALS

AD-633 527 **Field 11D, 11E, 13H**
CFSTI Prices: HC$2.00 MF$0.50
United Aircraft Corp., East Hartford, Conn. Research Labs.
INVESTIGATION OF A PROCESS FOR THE PRODUCTION OF METALLIC FILAMENTS.
Final technical rept., 9 Apr 65-8 May 66,
by R. D. Veltri, and J. E. Cox. 8 Jun 66, 45p
Rept. no. E910342-5
Contract NOw-65-0447-d

Descriptors: (*Glass textiles, Composite materials), (*Beryllium, *Fiber metalurgy), (*Composite materials, Compatibility), Glass, Filaments, Metals, Casting.

The process investigated involves the continuous casting of beryllium metal as a core material in a glass capillary as the capillary is continuously drawn from glass tubing. The vigorous reaction between molten beryllium and glass prevented successful development of this process, and most of the effort was spent in studying means of introducing molten beryllium into the core of glass fibers with a minimum reaction time. Some glass compositional studies were also made in an effort to improve the compatibility between beryllium and glass at high temperature. A pressure ejection technique of squirting a stream of molten beryllium vertically downward from a beryllium oxide nozzle into the cone of glass fiber formation appeared to be the most promising method for reducing the reaction time. Problems involving beryllium-glass reaction, control of metal flow, nozzle design, heating techniques and material purity must be overcome before this process can succeed. The glass compositional study has given encouraging results. Experimental glasses, used as an intermediate layer between the beryllium and the conventional fiberizing glass, appeared to reduce the severity of the usual beryllium-glass reaction. The extent of this investigation has been too limited to warrant any definite conclusions. (Author)

AD-633 984 **Field 11D, 20K, 11E**
CFSTI Prices: HC$2.00 MF$0.50
Watervliet Arsenal, N. Y. Benet Labs.
EFFECT OF FIBER GEOMETRY ON STRESS IN FIBERREINFORCED COMPOSITE MATERIALS. PHASE 2.
Technical rept.,
by Thomas F. MacLaughlin. Apr 66, 26p
Proj. DA-1-C-0-14501-B-33A
WVT 6610

Descriptors: (*Composite materials, Stresses), (*Fibers, Reinforcing materials), Geometry, Photoelasticity, Shear stresses.

Six additional two-dimensional photoelastic models of fiber-reinforced composite material configurations were constructed and tested to study the effects on the shear stress distribution in an elastic matrix of (1) a gradually tapered fiber, (2) a fiber whose end was unbonded from the matrix, and (3) aligned fibers having various gap lengths between fiber ends. The tapered and unbonded fiber ends were found to produce somewhat higher peak stresses in the matrix than fiber end shape models tested in the phase 1 investigation. It made little difference whether the gap between aligned fiber

ends was open, simulating a void resulting from a broken fiber, or filled with matrix material. (Author)

AD-633 472 See Field 11B

AD-633 947 See Field 13J

AD-634 074 See Field 11B

11E. FIBERS AND TEXTILES

AD-633 816 **Field 11E, 7E**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
GRAFTED COPOLYMERS OF CELLULOSE WITH CERTAIN VINYL MONOMERS,
by U. Azizov, Kh. U. Usmanov, and M. U. Sadykov. 21 Jan 66, 13p FTD-TT-65-1481
TT 66-61418
Unedited rough draft trans. of Khimiya i Fiziko-Khimiya Prirodnykh i Sinteticheskikh Polimerov, n1 p23-8 1962.

Descriptors: (*Cellulose, Copolymerization), (*Acrylic resins, Copolymerization), (*Vinyl plastics, Copolymerization), (*Fibers (Synthetic), Cellulosic plastics), Radiation chemistry, Gamma rays, Fatty acid esters, Acetates, Solvents, Tensile properties, Moistureproofing, USSR.

Identifiers: Graft polymers, Methyl acrylates, Methyl methacrylates, Vinyl acetates.

Grafted copolymers of cellulose with methylacrylate, methylmethacrylate, and vinylacetate were obtained under the action of gamma rays. The nature of the polymer and its solvent has an influence on the formation of grafted copolymers of cellulose with different monomers. The grafting to cellulose of the indicated monomers does not bring about a notable change in the tensile strength of the fiber, but leads to a lessening of the hydrophily of the grafted copolymers. (Author)

AD-633 527 See Field 11D

AD-633 881 See Field 19D

AD-633 984 See Field 11D

AD-634 058 See Field 13J

11F. METALLURGY AND METALLOGRAPHY

AD-268 627 **Field 11F, 13J**
CFSTI Price: HC$2.60
Massachusetts Inst. of Tech., Cambridge.
THE INFLUENCE OF MECHANICAL FIBERING ON BRITTLE FRACTURE IN HOT-ROLLED STEEL PLATE,
by B. M. Kapadia, A. T. English, and W. A. Backofen. 1 Dec 61, 25p Progress rept. no. 2.
Contracts NObs-72386, NObs-84321,
Proj. SR-147,
Task 2004
SSC 138

Descriptors: (*Fracture (Mechanics), Metal plates), (*Steel, Ship plates), Brittleness, Fiber metallurgy.

Several factors are involved in the formation of fissures on a microscale: the presence of finely dispersed fiber elements, plastic strain, and a stress normal to any plane in which the fiber is aligned. The strain and stress factors were found to different degrees in the various tests, so that the contribution of the extragrain-size effect to transition temperature depended on the test employed and the criterion for transition. A classification was suggested from van der Veen notched slow-bend, to Charpy V-notch, to pure tensile loading, on the basis of decreasing tendency to promote fissuring at transition. Using the van der Veen test and 32-mm fibrous criterion, the transition temperature for controlled-rolled plate is lowered for reasons other than grain refinement by 10-15 C, or 2-3 times that when the temperature is taken at the Charpy V-notch 15 ft-lb level. (Author)

AD-633 558 **Field 11F**
CFSTI Prices: HC$3.00 MF$0.75
Denver Research Inst., Colo.
RESEARCH ON THE SAMARIUM-TYPE STRUCTURE OF INTRARARE-EARTH BINARY SYSTEMS.
Final rept.,
by C. E. Lundin. 30 Apr 66, 80p DRI-2326
Contract Nonr-3661 (02)

Descriptors: (*Alloys, Rare earth elements), (*Rare earth elements, *Phase studies), Crystal structure, Rare earth compounds, Intermetallic compounds, Microstructure, Resistance (Electrical), Metallography, X-ray diffraction analysis, Thermal analysis, Thermodynamics.

A total of thirteen representative intra-rare-earth binary systems were studied to determine the criteria of formation and the characteristics of the unusual samarium-type structure formed in these alloy systems. The techniques used in the studies included metallography, x-ray diffraction analysis, hardness, thermal analysis, resistivity, dilatometry, density, electron-beam microprobe analysis, and liquid-metal-solution calorimetry.

AD-633 601 **Field 11F, 11B**
CFSTI Prices: HC$2.00 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.
ETCH-PITTING CHARACTERISTICS OF HIGH-PURITY MOLYBDENUM.
Interim technical rept.,
by H. L. Prekel, and A. Lawley. Jul 65, 38p I-B2195-1
Contract Nonr-4434 (00)

Descriptors: (*Molybdenum, Etching), Defects (Materials), Metallic crystals, Crystal lattice defects, Single crystals, Microstructure, Electron microscopy, Foils.

The etch-pitting behavior of single and polycrystalline molybdenum was examined using various etching solutions and prior heat treatments. Murakami's solution, Wolff's solution, oxalic acid and sulphuric acid in methanol are found effective on planes in a region 30 degrees about <001>, however it is shown that a one to one correspondence between etch-pits and dislocations does not necessarily exist. A plane about 11 degrees from <112> towards <012>, which is to be the observation plane in the dislocation velocity studies, was examined in detail. Reliable and reproducible pitting of dislocation sites occurs on this plane with a diluted Murakami's solution. A one to one correspondence between etch-pits and dislocations was positively established by transmission electron microscopy of thin foils of this orientation etched prior to examination. The etch-pit shape depends critically on the crystal orientation but is independent of the nature or Burgers vectors of the dislocations. Annealing of molybdenum single crystals at about 1900 degrees C in hydrogen for 8 hours lowers the dislocation density from about 10 to the 8th power/sq cm to 1,000,000/sq cm as determined from both etch-pitting and transmission electron microscopy. The dislocation density is reduced by (i) complete removal of carbides in the metal matrix (the carbides being responsible for the high in-grown dislocation density) and (ii) rearrangement of the dislocations into sub-grain boundaries. (Author)

AD-633 664 **Field 11F, 13I**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
EXTRUSION STEEL AND FIELD OF THEIR APPLICATION,
by L. A. Poznyak, and A. M. Rogalev. 17 Mar 66, 17p FTD-TT-65-1417
TT 66-61402
Unedited rough draft trans. of Eksperimentalnyi Nauchno-Issledovatelskii Institut Kuznechno-Pressovogo Mashinostroeniya, Moscow. (Nauchnye Trudy) n9 p5-14 1964.

Descriptors: (*Steel, *Dies), (*Tool steel, Dies), USSR, Extrusion, Mechanical properties, Chemical analysis.

AD-633 725 **Field 11F, 7D**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy.
MOSSBAUER EFFECT IN IRON-CARBON AND IRON-NITROGEN ALLOYS.
Technical rept.,
by P. M. Gielen, and Roy Kaplow. 20 Apr 66, 63p TR-10, DSR-7618
Contract Nonr-1841 (38)

Descriptors: (*Iron alloys, *Mossbauer effect), Atomic spectroscopy, Solid solutions, Impurities, Carbon, Martinsite, Nitrogen, Metallurgy, Quadrupole moments, Iron, Austinite.

Interstitial solid solutions of carbon and nitrogen in iron were analyzed by Mossbauer spectroscopy. In both allotropic forms, austenite (gamma) and martensite (alpha), electric quadrupole effects were observed, arising from a repopulation of electrons among the d-orbitals of iron atoms adjacent to the interstitial atoms. In carbon austenite, the quadrupole effect of e sq qQ/2 = 0.625 mm/sec for iron atoms which are first neighbors of carbon atoms. In nitrogen-austenite, the quadrupole effects are smaller but an appreciable positive isomer shift is observed for iron atoms which are first neighbors of nitrogen atoms. This suggests that these iron atoms have more d-electrons due to some covalent bonding with nitrogen as exists in the isomorphous Fe4N phase. Carbon shows a positive and nitrogen a negative ion behavior in both martensite and in austenite. The c-axis is a direction of difficult magnetization in both Fe-C and Fe-N martensites.

AD-633 767 **Field 11F**
CFSTI Prices: HC$4.00 MF$0.75
Alcoa Research Labs., Aluminum Co. of America, New Kensington, Pa.
INVESTIGATION OF THE MECHANISM OF STRESS CORROSION OF ALUMINUM ALLOYS.
Final rept. 16 Feb 65-16 Feb 66,
by J. McHardy. 16 Feb 66, 127p
Contract NOw-65-0327-f

Descriptors: (*Aluminum alloys, *Stress corrosion), Microstructure, Fracture (Mechanics), Cathodic protection, Electron microscopy, Defects (Materials).

Identifiers: Aluminum alloy 7075.

The results suggest three stages in the stress corrosion process with the rate of penetration of corrosion or cracking increasing with each succeeding stage. In the first stage, stress corrosion takes place independently of stress, that is, it follows the same course as the general corrosion of an unstressed specimen; for the alloys investigated this general corrosion occurred as random pitting. In the second stage, the attack becomes intergranular (if not already of this type) and directional, and it leads to the development of cracks of a microscopic size, or larger; these are the secondary cracks frequently seen in specimens that fail by stress-corrosion cracking. The third stage initiates whenever one of the intergranular cracks developed in the second state progresses far enough for the yield strength of the specimen to be reached; and it continues to the point of tensile failure. (Author)

AD-633 770 **Field 11F**
CFSTI Price: MF$0.50
Naval Research Lab., Washington, D. C.
THE INTERPRETATION OF ELECTRON MICROSCOPE FRACTOGRAPHS.
Final rept.,
by C. D. Beachem. 21 Jan 66, 51p NRL-6360
Projs. RRMA-02-061/652-1/R007-01-01, RR-007-01-46-5406

Descriptors: (*Fractography, *Electron microscopy), Fracture (Mechanics), Analysis.

The report was prepared to aid the relative newcomer to electron fractography in the interpretation of fractographs. Accurate interpretation depends on understanding the effects of electron microscope and replica variables on photographic densities in the fractographs. Briefly, some of these effects are as follows: Contrast decreases with increasing electron gun potential and lens aperture size. Electron density decreases and hence photographic density in the printed fractograph increases with the amount of replica material penetrated by the electrons. This, in turn, increases with an increase in the local thickness of the replica or with a decrease in the angle between the local replica surface and the incident electron beam. The thickness of the replica depends on the vacuum in the bell jar during formation of the replica, the angle of the local feature with respect to the depositing metal or carbon, and the distance between the feature and the source of the carbon or metal. During shadowing, convex features cast external shadows and tend to grow larger, while concave features contain their shadows and tend to remain the same size but to fill up with shadowing material. Interpretation is aided by stereoscopic viewing and by precision matching of mating fracture surfaces. Replica fidelity is a function of the choice of replication technique, with the direct carbon process generally being superior, and of the shape of both the features under study and immediately adjacent portions of the replicas. (Author)

AD-633 771 **Field 11F, 13K**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
FATIGUE PROPERTIES OF NONFERROUS ALLOYS FOR HEAT EXCHANGERS, PUMPS, AND PIPING,
by M. R. Gross, and R. C. Schwab. May 66, 31p
MEL-232/66

Descriptors: (*Copper alloys, Fatigue (Mechanics)), (*Nickel alloys, Fatigue (Mechanics)), (*Fatigue (Mechanics), Corrosion-resistant alloys), Pipes, Heat exchangers, Pumps, Environmental tests, Salt water, Bronze, Mechanical properties, Aluminum alloys.

Identifiers: Monel (Alloys, Cupronickel (Alloys), Cufenloy 40, Monel E.

The fatigue behavior of 13 nonferrous alloys used for corrosion-resistant heat exchangers, pumps, and piping systems was investigated over a broad life spectrum of 100 to 100-million cycles. Both cast and wrought copper-base and nickel-base alloys were studied. It is concluded that wrought Monel and forged Ni-Al bronze have the highest fatigue strengths, whereas gun metal and valve bronze have the lowest. The effect of salt water on fatigue performance was not found to be highly significant. The use of Langer's equation to predict stress-cycle relationships gave satisfactory results for wrought alloys but appeared to be overly conservative for cast alloys. (Author)

AD-633 886 **Field 11F, 11B, 7D**
CFSTI Prices: HC$3.00 MF$0.75
Thayer School of Engineering, Dartmouth Coll., Hanover, N. H.
STUDIES OF METAL-CERAMIC REACTIONS IN HIGH STRENGTH STEEL CAST ALLOYS.
Interim technical rept. for 1 Dec 64-30 Nov 65,
by Donald R. Muzyka, and George A. Colligan.
30 Nov 65, 72p DCW-1
Contract DA-19-020-AMC-00508 (X),
Proj. DA-1A024401A110
AMRA CR-66-01/1

Descriptors: (*Ceramic materials, Molding materials), (*Steel alloys, *Costing), (*Molding materials, Compatibility), Reaction kinetics, Oxidation-reduction reactions, Surface properties, Oxides, Iron, Chromium alloys, Zirconium compounds, Silicon compounds, Phase studies.

Experimental studies were made of reactions of mold refractory and crucible refractories with molten metal at the metal-refractory interface. Iron and iron-chromium alloys were studied in the solid and liquid state in contact with silica and stabilized zirconia refractory materials. Preliminary studies indicated the beneficial effect of chromium additions to iron in minimizing interface reaction. Based on these preliminary studies, phase equilibria and kinetic experiments were performed. Light microscopy, electron microprobe analysis, quantitative x-ray diffraction and dilatometric analyses were performed on the resulting specimens.

AD-633 925 **Field 11F, 11B, 11J, 13J K**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
PROTECTION AGAINST SEA CORROSION BY LIQUID NAIRITS,
by A. Labutin, and K. Monakhova. 1966, 4p
Translation-2158
TT 66-61438
Zashchita ot Morskoii Korrozii Zhidkimi Naipitami, trans. of Morskoi Flot (USSR) n7 p33-4 1965.

Descriptors: (*Chloroprenes, Corrosion inhibition), (*Corrosion inhibition, *Rubber coatings), Sea water, Synthetic rubber, Liquids, Vulcanizates, USSR.

The use of chloroprene rubber (nairit) coatings for protecting metal equipment against sea corrosion is discussed.

AD-633 986 **Field 11F, 11B, 11C**
CFSTI Prices: HC$2.00 MF$0.50
Watervliet Arsenal, N. Y. Benet Labs.
PROCESS FOR ANODIZING TITANIUM.
Technical rept.,
by Theodore M. Pochily. Apr 66, 44p
Proj. DA-66267
WVT 6605

Descriptors: (*Titanium, *Anodic coatings), Bearings, Wear resistance, Mechanical properties, Electrolysis, Electroless plating.

The requirements of an advancing technology in weaponry, aircraft, and aerospace have necessitated a consideration of light metals as a substitute for steel. In the search to reduce weight, and consequently increase mobility, titanium offers valuable assistance. The use of titanium as an engineering and structural material has been accepted for a comparatively short time. This acceptance was predicated on two important factors, strength/weight ratio and corrosion resistance. The tendency of titanium to gall and seize, when used as a bearing or mating surface, has restricted a full utilization of the metal. Work conducted at Watervliet Arsenal to develop a process that reduces or eliminates this condition was evaluated. Processing details, a summary of test data covering wear resistance, and the effects of the process on the mechanical properties of titanium are discussed. (Author)

AD-633 992 **Field 11F, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Naval Air Engineering Center, Philadelphia, Pa. Aeronautical Materials Lab.
INFLUENCE OF SOME PROCESSING VARIABLES UPON THE ELEVATED AND ROOM TEMPERATURE STRENGTH OF ULTRAFINE BERYLLIUM WIRES,
by William H. Golding. 9 May 66, 28p NAEC-AML-2441
Task RRMA-03-004/200-1/R007-04-01

Descriptors: (*Chemical milling, Wire), (*Beryllium, Wire), (*Wire, Tensile properties), Processing, Temperature, Nickel, Castings.

An ultrafine beryllium wire was produced with a strength of approximately 150 ksi at room temperature and possessing excellent elevated temperature ductility. The application of a nickel coating to the wire allays the effects of transverse crack formation in the beryllium core until complete separation of the metals at the beryllium-nickel interface occurs at 1100F. As a result of this protection, the elevated temperature tensile strength of the nickel clad wire is substantially greater than bare beryllium wire at all temperatures and nearly twice that of bare wires in the temperature range 600-1100F. The effect of a Ti02 coating on some of the wires processed from ingot material, however, must be considered inconclusive because of the damaging influence of poor surface quality of the beryllium core. The chemical-milling procedure not only improves the surface quality vastly, but tensile strength at room temperature can be increased by as much as 30 ksi.

AD-634 094 **Field 11F, 13J, 13H**
CFSTI Prices: HC$4.00 MF$0.75
Naval Research Lab., Washington, D. C.
METALLURGICAL CHARACTERISTICS OF HIGH STRENGTH STRUCTURAL MATERIALS.
Quarterly rept.,
by R. J. Goode, R. W. Huber, D. G. Howe, R. W. Judy Jr., and P. P. Puzak. Nov 65, 104p NRL-6405, QR-9
Projs. SF-020-01-05-0731, RR-007-01-46-5414
See also AD-625 374.

Descriptors: (*Submarine hulls, Metal plates), (*Titanium alloys, Fracture (Mechanics)), (*Aluminum alloys, Fracture (Mechanics)), (*Steel, Fracture (Mechanics)), Nickel alloys, Chromium alloys, Molybdenum alloys, Vanadium alloys, Toughness, Heat treatment, Stress corrosion, Fatigue (Mechanics), Welding.

Identifiers: Fracture toughness, Aluminum alloy 7079.

The report includes fracture toughness studies on high strength steels, titanium alloys, and aluminum alloys. Fracture Toughness Index Diagrams, modified to include the latest information, are presented for these materials; the effects of melting practice and processing variables are reflected in the Fracture Toughness Index Diagram for steels by the addition of a new optimum materials trend line for consumable-electrode-vacuum melting of steels. Results are presented for studies concerning (1) the use of side-grooved plane-strain fracture mechanics specimens for valid determinations of fracture toughness, (2) heat-treatment effects on fracture toughness of several titanium alloys, (3) the effect of vacuum heat treatment on stress-corrosion-cracking sensitivity of titanium, and (4) the screening of a variety of titanium alloy plates for sensitivity to stress-corrosion-cracking. The effects of mean strain on low-cycle fatigue crack propagation in 5Ni-Cr-Mo-V steel and 7079-T6 aluminum are presented. Also described in a newly-developed low-cycle fatigue crack propagation test employing fracture mechanics parameters. Results are given for D6AC steels studied in this new test. (Author)

N66-21814 **Field 11F**
CFSTI Prices: HC$2.00 MF$0.50
Aluminum Co. of America, New Kensington, Pa. Research Labs.
NEW WELDABLE HIGH STRENGTH ALUMINUM ALLOYS FOR CRYOGENIC SERVICE,
by J. H. Hess, and H. Y. Hunsicker. 1966, 32p
Contract NAS8-5452
NASA CR-71534

Descriptors: *Aluminum alloy, *Cryogenic storage, *High strength alloy, *Rocket propellant tank, *Structural material.

N66-22263 Field 11F
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTAL THERMAL SHOCK RESISTANCE OF ZIRCONIA WITH 15 MOLE PERCENT TITANIUM,
by A. Arias. 18 Feb 65, 14p NASA-TM-X-56344

Descriptors: *Quenching, *Resistance, *Thermal shock, *Zirconium compound, *Heat transfer.

N66-22320 Field 11F
CFSTI Prices: HC$3.00 MF$0.75
Lockheed Nuclear Products, Marietta, Ga.
EFFECT OF NUCLEAR RADIATION ON MATERIALS AT CRYOGENIC TEMPERATURES.
Quarterly rept. no. 2, 21 Oct 65-21 Jan 66,
by C. A. Schwanbeck. Feb 66, 89p LAC-ER-8372
Contract NAS3-7985
NASA CR-54904

Descriptors: *Aluminum alloy, *Cryogenic temperature, *Nuclear radiation, *Fatigue, *Tensile strength, *Titanium alloy.

N66-22327 Field 11F
CFSTI Prices: HC$2.00 MF$0.50
General Electric Co., Cincinnati, Ohio. Missile and Space Div.
ADVANCED REFRACTORY ALLOY CORROSION LOOP PROGRAM.
Quarterly progress rept. no. 3 for 15 Jan 66,
by R. W. Harrison. 3 Feb 66, 33p
Contract NAS3-6474
NASA CR-54911

Descriptors: *Corrosion, *Alkali metal, *Loop, *Purification, *Refractory alloy.

N66-22328 Field 11F
CFSTI Prices: HC$3.00 MF$0.50
TRW Equipment Labs., Cleveland, Ohio. Materials Research and Development Dept.
GENERATION OF LONG TIME CREEP DATA ON REFRACTORY ALLOYS AT ELEVATED TEMPERATURES.
Quarterly rept. no. 10, 26 Sep-26 Dec 65,
by J. C. Sawyer, and E. A. Steigerwald. 8 Jan 66, 60p
Contract NAS3-2545
NASA CR-54895

Descriptors: *Creep, *Refractory alloy, *High temperature alloy, *Molybdenum alloy.

N66-22345 Field 11F
CFSTI Prices: HC$2.00 MF$0.50
TRW Equipment Labs., Cleveland, Ohio.
DETERMINATION OF ELEVATED-TEMPERATURE FATIGUE DATA ON REFRACTORY ALLOYS IN ULTRA-HIGH VACUUM.
Quarterly rept. no. 6, 1 Oct 65-1 Jan 66,
by C. R. Honeycutt, and J. C. Sawyer. 15 Jan 66, 31p
Contract NAS3-6010
NASA CR-54916

Descriptors: *Fatigue test, *Zirconium alloy, *Molybdenum alloy, *Refractory alloy, *Titanium alloy, *Ultrahigh vacuum.

N66-22355 Field 11F
CFSTI Prices: HC$6.00 MF$1.25
Marquardt Corp., Van Nuys, Calif.
INVESTIGATION OF HIGH STRAIN RATE BEHAVIOR OF REFRACTORY ALLOYS AND COATINGS.
Final rept.,
by T. Miyagishima. Feb 66, 234p PR-3009-F
Contract NAS9-4905
NASA CR-65319

Descriptors: *Dynamic load, *Rocket engine, *Combustion chamber, *Refractory alloy, *Strain rate.

PB-170 550 Field 11F
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
TRANSFORMATION ISOTHERME beta to alpha DANS L'URANIUM PUR ET FAIBLEMENT ALLIE (beta to alpha Isothermal Transformation in Pure and Weakly Alloyed Uranium),
by Henri Aubert, and Claude Lelong. Mar 66, 54p CEA-R-2956
Text in French; Attached summary in English.

Descriptors: (*Uranium, Transformations), (*Transformation, Uranium), (*Uranium alloys, Phase studies), (*Phase studies, Uranium alloys), Bainite, Martensite, Chromium alloys, Silicon alloys, Molybdenum alloys, Iron alloys, Aluminum alloys, Zirconium alloys, France.

The TTT diagrams describing the beta to alpha isothermal transformation have been made by isothermal dilatometry for pure uranium and 21 alloys based on chromium, silicon, molybdenum, iron, aluminium, zirconium. The thermal cycle preceeding the isothermal step influences the decomposition kinetics at temperature corresponding to the eutectoid and martensitic mechanisms, but not in the range where the bainitic transformation occurs. The stability of the beta phase decreases with the chromium, molybdenum and silicon concentration; it is affected differently for each of the three transformation mechanisms. The ternary additions, even at very low concentration have a considerable effect on the stability. When the concentration decreases the martensitic mechanism is active at progressively higher temperature, diminishing to the point of disappearance the temperature range where the transformation is considered as being of the bainitic mode. (Author)

AD-270 697 See Field 20B

AD-633 512 See Field 13H

AD-633 513 See Field 13H

AD-633 568 See Field 19A

AD-633 600 See Field 20B

AD-633 623 See Field 19A

AD-633 658 See Field 20K

AD-633 669 See Field 20B

AD-633 672 See Field 20L

AD-633 722 See Field 20B

AD-633 830 See Field 7D

AD-633 897 See Field 11C

AD-634 031 See Field 13H

AD-634 034 See Field 20L

AD-634 035 See Field 20L

AD-634 075 See Field 13H

AD-634 076 See Field 13H

AGN-TM-413 See Field 18I

AGN-TM-414 See Field 18I

BNWL-188 See Field 18J

IS-1325 See Field 18J

LA-3476 See Field 18J

PB-169 980 See Field 21H

11G. MISCELLANEOUS MATERIALS

AD-633 926 See Field 13J

11H. OILS, LUBRICANTS, AND HYDRAULIC FLUIDS

AD-633 699 Field 11H, 20D
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
STUDYING THE MOVEMENT OF A LIQUID IN A JET TUBE,
by L. M. Trifonov. 17 Mar 66, 18p FTD-TT-65-1407
TT 66-61413
Unedited rough draft trans. of Politekhnicheskii Institut, Leningrad. Trudy (USSR) n233 p77-84 1964.

Descriptors: (*Liquids, Fluid flow), (*Hydraulic fluids, Motion), Oscillation, USSR, Pipes, Jets, Nozzles, Vibration.

AD-633 714 Field 11H, 14B
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
POSSIBILITY OF THE INVESTIGATION OF THE KINETICS OF OIL SOLIDIFICATION BY THE ULTRASONIC METHOD,
by V. F. Dudin, Zh. I. Shaulov, and S. N. Khadzhiev. 21 Jan 66, 12p FTD-TT-65-1484
TT 66-61415
Unedited rough draft trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) n8 p58-60 1964.

Descriptors: (*Oils, *Ultrasonic radiation), Solids, Dynamics, Crystallization, Viscosity, USSR.

Identifiers: Solidification.

AD-634 033 Field 11H, 1C
CFSTI Prices: HC$1.00 MF$0.50
Shell Oil Co., Wood River, Ill. Research Lab.
STUDY OF HELICOPTER GEAR LUBRICATION.
Quarterly progress rept. no. 4, Dec 65-Feb 66,
by D. R. Bailey, S. J. Beaubien, D. E. Stuart, and J. E. Lumos. 17 Jun 66, 21p
Contract NOw-65-0323-c
See also AD-628 446.

Descriptors: (*Helicopters, Gears), (*Gears, *Lubrication), Wear reistance, Hardness, Loading (Mechanics), Fatigue (Mechanics), Tests.

Studies to determine the effect of hardness on the fatigue life of gears were continued. In constant load tests preceded by break-in, using MAAG B gears and with two synthetic tetraester-base lubricants (designated MIL-L-23699 (A) and MIL-L-23699 (B)), it was found that an increase in hardness of about five Rockwell C (Rc) units resulted in a doubling of gear life. At the same constant transmitted load of 496 lb, the MIL-L-23699 (A) lubricant was superior in regard to fatigue life, giving about 3-1/2 times the life of MIL-L-23699 (B) over a hardness range of 40 to 63 Rc. The magnitude of transmitted load was found to have a considerable effect on fatigue life over a range of hardness. In tests with MIL-L-23699 (A) oil, reducing the load from 637 to 496 lb resulted in from 637 to 496 lb resulted in a nine-fold increase in life. Based on a straight-line relationship between load and log life, this amounts to doubling the gear life for each decrease in transmitted load of 45 lb. Tests run on gear systems of different chemical composition showed a considerable variation in

score load and fatigue life. There is apparently no simple relationship between chemical composition, surface finish, or hardness, and the performance of these gears. (Author)

AD-634 112 See Field 13I

11I. PLASTICS

AD-633 579 Field 11I
CFSTI Prices: HC$5.00 MF$1.00
Hughes Aircraft Co., Culver City, Calif. Library.
A BIBLIOGRAPHY ON POLYTETRAFLUORO ETHYLENE (TEFLON) PLASTICS,
by J. T. Milek, H. E. Wilcox, and M. Bloomfield. Nov 65, 169p LS-BIB-65-3

Descriptors: Halocarbon plastics, Bibliographies), Chemistry, Chemical properties, Electrical properties, Mechanical properties, Thermal properties, Polymerization.

Identifiers: Polytetrafluoro ethylene.

The bibliography contains 2047 entries concerning the chemistry, properties (chemical, electrical, mechanical, thermal), applications, and polymerization of polytetrafluoro ethylene plastics, based on the journal and report literature which had appeared as of mid 1965.

AD-633 787 Field 11I
CFSTI Prices: HC$1.00 MF$0.50
Frick Chemical Lab., Princeton Univ., N. J.
PROPERTIES OF LINEAR ELASTOMERIC POLYURETHANES.
Technical rept.,
by Stuart L. Cooper, and Arthur V. Tobolsky.
May 66, 20p RLT-92
Contract Nonr-1858 (07),
Proj. NR-356-377

Descriptors: (*Isocyanate plastics, Viscoelasticity), Polymers, Plasticizers, Elastomers, Polyester plastics.

The viscoelastic properties of some polyester-urethanes are compared with the properties of other polymers. The behavior observed is anomalous in that these polyurethanes exhibit an unusually high value of modulus well above their T sub g, unaccounted for by either crosslinking or crystallinity. Various experiments including incorporation of plasticizers of widely varying chemical composition have suggested interpretation of the system as a block copolymer, each block having its own T sub g. Each of the two types of blocks seems to associate with similar blocks from other molecules. (Author)

AD-633 891 Field 11I, 14E, 20K
CFSTI Prices: HC$2.00 MF$0.50
Clothing and Organic Materials Div., Army Natick Labs., Mass.
PHOTOGRAPHIC STUDY OF STRESS WAVE PROPAGATION AND CRACK GROWTH IN A TRANSPARENT PLASTIC.
Interim technical progress rept., Nov 64-Aug 65,
by Anthony F. Wilde, and John J. Ricca. May 66,
34p C/OM-19
Proj. DA-1L013001A91A
USA NLABS TR-66-46-CM

Descriptors: (*Plastics, *Photographic analysis), (*Stresses, Photographic analysis), (*Fracture (Mechanics), Photographic analysis), Impact tests, Refraction, Propagation, Velocity, High-speed photography, Transparent panels.

In order to develop techniques for studying the transient behavior of plastic materials subjected to mechanical impact, a preliminary photographic investigation was undertaken with an electronic image converter camera system. Two types of events were recorded with CR-39 plastic serving as the specimen material: Stress pulses, produced in the plastic by mechanical impaction, were studied by observation of the resulting fringe patterns. The pulse fronts were characterized in terms of shape and propagation velocity. An empirical equation was derived to express the decrease in slope of segments of the pulse front as it propagated through the specimen. Propagating cracks, generated in the plastic by mechanical impact, were subjected to photographic analysis. Crack propagation velocities and estimated crack initiation times were obtained. These served to yield a rough estimate of the magnitude of the incident longitudinal pulse level at which crack initiation occurred. (Author)

N66-21780 Field 11I
CFSTI Prices: HC$3.00 MF$0.75
Notre Dame Univ., Ind. Dept. of Chemistry.
FUNDAMENTAL STUDIES OF THE SYNTHESIS OF HEAT-RESISTANT POLYMERS. SOME PARAMETERS IN THE EVALUATION OF THE THERMAL STABILITY OF POLY (P-XYLYLIDENE-P-PHENYLENEDIAMINE).
Progress rept. no. 9, 15 Sep 65-31 Jan 66,
by G. F. Dalelio. 15 Feb 66, 69p
Grant NsG-339
NASA CR-71541

Descriptors: *Polymer physics, *Thermostability, *Heat resistance, *Phenylene diamine, *Thermogravimetry.

N66-21809 Field 11I
CFSTI Prices: HC$4.00 MF$1.00
Monsanto Research Corp., Dayton, Ohio.
DEVELOPMENT OF IMPROVED PLASTIC FOAM GENERATING AGENTS AND TECHNIQUES FOR SATURN APPLICATIONS.
Final rept., Jul 64-Jun 65,
by C. L. Bellanca, R. T. Jefferson, B. R. Hickman, and I. O. Salyer. 1965, 154p
Contract NAS8-11373
NASA CR-71525

Descriptors: *Saturn launch vehicle, *Foam, *Plastic material, *Urethane.

PB-169 619 Field 11I
CFSTI Prices: HC$14.60 MF$1.00
Ministry of Aviation, London (England). Directorate of Materials and Structures.
POLYVINYLCARBAZOLE.
Research and development rept.,
by L. P. Ellinger. Aug 65, 149p D.Mat./S. no. 131
Prepared in cooperation with British Oxygen Co., Ltd.

Descriptors: (*Expanded plastics, Preparation), (*Vinyl plastics, Preparation), (*Organic nitrogen compounds, Polymers), Free radicals, Catalysis, Polymerization, Physical properties, Dielectric properties, Thermal stability, Laminates, Polarization, Absorption (Physical), Thermal conductivity, Density, Solubility, Flammability, Great Britain.

Identifiers: Polyvinyl carbazoles, Vinyl carbazoles.

A process for the polymerisation of vinylcarbazole to foamed polymer granules of K values 65-87, and softening range 200-220C developed up to a scale of 2 kg/batch. The operations required to mould these granules into panels of densities in the range 0.04 0.2 g/ml are described. Small hemispherical mouldings were also obtained. These mouldings can be laminated with fibre glass and postformed. Results of extensive studies on the properties of the materials are reported. Blocks of polyvinylcarbazole of much improved quality and appearance were made using an improved polymerisation process and monomer sufficiently free of certain impurities. The polymerisation of vinylcarbazole by a wide range of materials, which increase the polarisation of vinylcarbazole, and especially by numerous electron acceptors, was discovered.

AD-633-470 See Field 7D

AD-633 603 See Field 1C

AD-633 944 See Field 19C

AD-634 058 See Field 13J

11J. RUBBERS

AD-283 324 Field 11J
CFSTI Price: HC$17.40
Stanford Research Inst., Menlo Park, Calif.
MECHANISMS OF REVERSIBLE AND IRREVERSIBLE LOSS OF MECHANICAL PROPERTIES OF ELASTOMERIC VULCANIZATES WHICH OCCUR AT ELEVATED TEMPERATURES.
Technical documentary rept.,
by Thor L. Smith. Jun 62, 178p
Contract AF 33 (616)-8298,
Projs. AF-7342, SRI-PRU-3659,
Task 734202
ASD TDR-62-572

Descriptors: (*Vulcanizates, Mechanical properties), (*Elastomers, Vulcanizates), Synthetic rubber, Failure (Mechanics), High temperature research.

Strength characteristics of five elastomeric gum vulcanizates were investigated over a wide range of conditions. Results from continuous and intermittent stress-relaxation evaluations made between 100 and 200 C showed that the thermal stabilities of the vulcanizates decrease in the following order: hydrofluorocarbon, resin-cured butyl, silicone, sulfur-cured butyl, and natural rubber. Tensile properties of each vulcanizate in the absence of thermal degradation were determined with an Instron tester at about 10 strain rates and 10 temperatures. Except for natural rubber, the ultimate tensile properties of each vulcanizate could be characterized by a time- and temperature-independent failure envelope which results from a plot of log sigma sub b 273/T vs. log epsilon sub b where sigma sub b is the tensile strength and epsilon sub b is the ultimate strains. No fundamental differences seem to exist in the strength characteristics of the various vulcanizates provided they are compared in corresponding temperature and physical states. Stress-strain curves for natural rubber were analyzed to separate time and final-strain effects. Between -20 and 100 C, the stress-strain data were time independent although they are temperature dependent. (Author)

AD-461 292 Field 11J
CFSTI Price: HC$1.00
Monsanto Research Corp., Everett, Mass. Boston Lab.
PHYSICAL AND RHEOLOGICAL PROPERTIES OF NITROSO RUBBERS.
Quarterly rept. no. 5, 25 Jun-24 Sep 65,
by G. L. Ball III, L. Gilman, H. S. Wilson, and I. O. Salyer. 24 Oct 64, 20p MRB4013Q5
Contract DA-19-129-AMC-151 (N),
Proj. MRC-4013

Descriptors: (*Synthetic rubber, Physical properties), (*Rheology, Synthetic rubber), Molecular weight, Viscosity, Solvents, Halogenated hydrocarbons.

Identifiers: Nitroso rubber.

Two nitroso gum samples were characterized as to molecular weight and similarity. Intrinsic viscosity measurements indicated molecular weights of from 1.38 to 1.57 x 10 to the 6th power. Insoluble content varied from 6 to 37% and fingerprinting by solution viscosity indicated that the two nitroso gums were different. Three solvents, FC-75, FC-43 and Freon 113, proved adequate for viscosity measurements. Light scattering measurements on an old 3M-produced gum indicated a weight average molecular weight of 400,000 as was predicted from viscosity measurements. (Author)

AD-462 148 **Field 11J, 21E, 11C, 6M**
CFSTI Price: HC$4.00
Battelle Memorial Inst., Columbus, Ohio
ELASTOMERS FOR FUEL SYSTEMS CONTAINING MICROORGANISM-CONTROLLING ADDITIVES.
Technical summary rept., 1 Oct 62-30 Sep 64,
by C. W. Cooper, Homer T. Kemp, and Robert M. Kell. Jan 65, 116p
Contract AF 33 (657)-9804,
Proj. AF-7381,
Task 738101
RTD TDR-63-4195-Pt. 2
See also AD-428 886.

Descriptors: (*Elastomers, Fuel systems), (*Fuel systems, Elastomeres), (*Microorganism, Fuel systems), (*Plastic coatings, Compatibility), Bacteria, Fungi, Corrosion, Fuel tanks, Storage tank, Corrosive liquids, Germacides, Fungicides, Nitrile rubber, Isocyanate plastics.

It was shown that certain species of bacteria and fungi, isolated from JP-4 fuel, grow rapidly on elastomeric coatings in laboratory exposures. Damage to coatings after one year of exposure was minimal, suggesting that growth alone is not as important as growth augmented by other factors such as corrosive materials in fuel-tank water bottoms. For example, aircraft fuel sump samples (without microorganisms) from various USAF bases were shown to be corrosive to both uncoated and coated 7075-T6 aluminum and to cause blistering of a topcoating. Although coating damage and metal corrosion could not be attributed to microbial action alone, control of microbial growth in fuel tanks which inhibit growth when added to coatings. Two of these in particular were effective at relatively low concentrations and are recommended for further study. It was also shown that three biocides selected for addition to fuel are not harmful ot most existing fuel-system coatings and elastomeric components, although one caused embrittlement of a nitrile rubber specimen. (Author)

AD-633 528 **Field 11J, 7C**
CFSTI Prices: HC$2.00 MF$0.50
Reaction Motors Div., Thiokol Chemical Corp., Denville, N. J.
CARBORANE-SILOXANE ELASTOMERS.
Quarterly rept. for 19 Feb-18 May 66,
by Nathan Mayes. May 66, 27p RMD-5065-Q5
Contract DA-11-070-AMC-852 (W),
Proj. 5065
See also AD-629 891.

Descriptors: (*Organoboranes, Elastomers), (*Siloxanes, Elastomers), (*Elastomers, Synthesis (Chemistry)), Chlorine compounds, Propanes, Ethers, Synthesis (Chemistry), Copolymerization, Silanes, Silicone plastics, Thermal stability, Thermogravimetric analysis, Differential thermal analysis, Oxidation, Heat-resistant materials, Decaboranes.

Identifiers: Carboranes, Bis (Chlorodimethylsilyl carboranyl) propanes, Bis (Methoxydimethylsilyl carboranyl) propanes.

The carborane silane monomers, bis (1-chlorodimethylsilyl-o-carboran-2-yl) propane and bis (1-methoxydimethylsilyl-o-carboran-2-yl) propane, were synthesized and copolymerized to a carborane polysiloxane. Thermal characterization of the polymer by TGA and DTA in air and nitrogen indicated thermal stability to 350C with no oxidation evident until over 400C. The thermal data illustrate the 'protective action' of carborane and its ability to stabilize neighboring groups to thermal oxidative degradation. (Author)

PB-169 618 **Field 11J**
CFSTI Prices: HC$1.60 MF$0.50
Royal Aircraft Establishment, Farnborough (England).
AN EVALUATION OF NITROSO RUBBER 'VULCANISATES',
by D. K. Thomas. Nov 65, 17p Technical rept. TR-65247

Descriptors: (*Synthetic rubber, Vulcanization), (*Vulcanizates, Physical properties), Organic nitrogen compounds, Polymers, Stresses, Solubility, Deformation, Creep, Tensile properties, Thermal stability, Molecular structure, Great Britain.

Identifiers: Nitroso rubber.

Measurement of continuous and intermittent stress-relaxation, solubility and swelling, creep and tensile properties, and heat stability, suggest that nitroso rubber has not yet been successfully vulcanized. The only system which is claimed to vulcanise these polymers does not result in a material having the properties to be expected of such a three dimensional network structure. (Author)

AD-633 925 **See Field 11F**

11L. WOOD AND PAPER PRODUCTS

PB-169 722 **See Field 5C**

PB-169 732 **See Field 5C**

PB-169 736 **See Field 5C**

PB-170 039 **See Field 5C**

PB-170 111 **See Field 5C**

PB-170 290 **See Field 5C**

PB-170 329 **See Field 5C**

12A. MATHEMATICS AND STATISTICS

AD-633 557 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.50
Stanford Univ., Calif. Dept. of Computer Science.
MINIMUM MULTIPLICATION FOURIER ANALYSIS.
Technical rept.,
by R. W. Hockney. 14 Dec 65, 56p CS-32
Contract Nonr-225 (24)

Descriptors: (*Fourier analysis, *Algorithms), Series, Harmonic analysis, Potential theory, Programming (Computers), Trigonometry.

Identifiers: Arithmetical operations.

Fourier analysis and synthesis is a frequently used tool in applied mathematics but is found to be a time consuming process to apply on a digital computer and this fact may prevent the practical application of the technique. This paper describes an algorithm which uses the symmetries of the sine and cosine functions to reduce the number of arithmetic operations by a factor between 10 and 30. The algorithm is applicable to a finite fourier (or harmonic) analysis on 12 X 2 to the qth power values, where q is any integer > or = 0 and is applicable to a variety of end conditions. A complete and tested B5000 Algol program known as FOURIER12 is included. (Author)

AD-633 559 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Florida State Univ., Tallahassee. Dept. of Statistics.
TOPICS IN RANK-ORDER STATISTICS.
Technical rept.,
by Ralph A. Bradley. Dec 65, 29p FSU-Statistics-M108
Contract Nonr-988 (08),
Proj. NR-042 004
ONR TR-19
Rept. on The Development of Statistical Methods for Quality Control and Surveillance Testing. Prepared for presentation at the Berkeley Symposium on Mathematical Statistics and Probability, Applied Part, (5th), Dec 65.

Descriptors: (*Statistical tests, *Sequential analysis), (*Multivariate analysis, Statistical tests), Sampling.

Identifiers: Order statistics.

Two major topics are presented: (1) Sequential two-sample rank tests; and (2) Multivariate two-sample rank tests.

AD-633 595 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Research Analysis Corp., McLean, Va.
EVALUATION OF MULTIPLE-CRITERIA ALTERNATIVES USING ADDITIVE UTILITY MEASURES.
Technical paper,
by Peter C. Fishburn. Mar 66, 35p RAC-TP-200
Contract DA-44-188-ARO-1

Descriptors: (*Decision making, *Game theory), Decision theory, Numerical methods and procedures.

This paper explains two theories behind additive methods of using human value judgments in the evaluation of multifactor alternatives and describes how these methods may be used. The alternatives to be evaluated in such situations may be, for example, people, performances, plans, policies, products, or systems. The two additivity theories presented come from utility theory, which is concerned with people's preferences. One of these theories is nonprobabilistic; the other uses probabilities. Among the methods discussed for obtaining an evaluator's utility functions for the criteria in a multifactor or multiple-criteria situation are a number of indifference-judgment methods, a method that uses probabilities (the gambles method), and a class of direct numerical-assignment methods. (Author)

AD-633 625 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
COMPUTATIONAL METHODS FOR DETERMINING LOWER BOUNDS FOR EIGENVALUES OF OPERATORS IN HILBERT SPACE.
Technical memo.,
by D. W. Fox, and W. C. Rheinboldt. Mar 66, 75p TG-810
Contract NOw-62-0604-c

Descriptors: (*Operators (Mathematics), *Functional analysis), Boundary value problems, Numerical methods ; procedures.

Identifiers: Eigenvalues.

This report presents a survey of computational methods for determining lower bounds for eigenvalues of semi-bounded, self-adjoint operators in Hilbert space, in particular, of many operators associated with boundary value problems for ordinary and partial differential equations of mathematical physics and engineering. (Author)

AD-633 691 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.50
California Univ., Los Angeles. Dept. of Mathematics.
THE CLASS O (AD) OF RIEMANNIAN 2-SPACES.
Technical rept.,
by Norman Lee Breazeal. Jun 66, 51p TR-41
Grant DA-ARO (D)-31-124-G742,
Projs. AROD-1517-M, DA-20011501B704
AROD 1517:92

Descriptors: (*Algebraic topology, Potential theory), Complex variables, Invariance.

This dissertation is primarily concerned with the development of tests to determine whether a given 2-dimensional Riemannian space M belongs to the class O sub AD (to be specified), and the construction of an important class of covering 2-spaces with this property. An investigation is first made of the modulus function h and of a related multiple-valued function h*, the conjugate of h. It is shown in particular that every branch h* of h* is harmonic and that the level lines of h and h* form a system of coordinates which are orthogonal except on a set of measure zero. Let AD (M) be the class of harmonic functions on M with a finite Dirichlet integral on M and with vanishing flux across every 1-cycle. If the class AD (M) consists of constants then M belongs to the class O sub AD. A modular criterion is established to determine whether a given M belongs to O sub AD. This modular test is used to develop a second test in terms of a conformal metric. Moreover, a relation between the modulus and extremal length is established and used to determine a third test which uses regular chains. Finally Abelian type covering spaces of a compact 2-dimensional Riemannian space are constructed and, using the regular chain test, shown to belong to the degenerate class O sub AD. (Author)

AD-633 692 **Field 12A**
CFSTI Prices: HC$4.00 MF$1.00
Texas Univ., Austin. Computation Center.
A STUDY OF OPERATORS IN APPROXIMATION THEORY.
Interim technical rept. no. 9,
by Yasuhiko Ikebe. Apr 66, 133p
Grants DA-ARO (D)-31-124-G721, NSF-GP-5253,
Projs. AROD-3772-M, DA-009925001
AROD 3772:23
Grants NSF-G721, NSF-GP-217, NSF-GP-52.

Descriptors: (*Operators (Mathematics), *Approximation (Mathematics)), Theory, Mapping (Transformations), Functional analysis.

Identifiers: Existence theorems.

This dissertation consists of two independent chapters. The first chapter studies constants associated with best-approximation maps mainly in the space of all real-valued continuous functions on a closed interval. The second chapter contains several generalizations of a theorem due to Cheney and Goldstein. This theorem establishes the existence of bounded linear operators which best approximate nonlinear operators under certain conditions. The well-known Alaoglu theorem is also obtained in this chapter as a special case of more general theorems. (Author)

AD-633 718 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
THE GENERALIZED CAYLEY-HAMILTON THEOREM IN n DIMENSIONS.
Technical rept.,
by John S. Lew. 4 Mar 65, 12p TR-6, ARPA-AM-20
Contracts Nonr-562 (40), SD-86,
Proj. NR-NR-064-406
Rept. no. Nonr-562 (40)16.

Descriptors: (*Matrix algebra, *Theorems), Polynomials, Identities, Tensor analysis.

Identifiers: Cayley-Ham ilton theorem.

For any positive integer n, this paper derives the explicit form of the identity in n matrices, each nxn, which is obtained by complete polarization of the usual Cayley/Hamilton theorem, and which is used repeatedly, for n = 2 or 3, in the determination of an integrity basis for symmetric tensors. (Author)

AD-633 778 **Field 12A, 20K**
CFSTI Prices: HC$1.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Applied Mathematics.
ON THE SYMMETRY GROUPS OF SIMPLE MATERIALS - AN APPLICATION OF THE THEORY OF LIE GROUPS.
Technical rept.,
by Takayuki Nono. Apr 66, 12p TR-11, Nonr-562 (40)11
Contract Nonr-562 (40),
Proj. NR-064-406

Descriptors: (*Groups (Mathematics), Theory), Elasticity, Continuum mechanics, Tensor analysis, Partial differential equations.

The main purpose of this paper is to point out that the symmetry group of a simple material is a Lie subgroup of the unimodular group. The classification of symmetry groups and the determination of representation formulae for objective response functions can be established by the application of the theory of Lie groups. (Author)

AD-633 866 **Field 12A**
Chicago Univ., Ill.
ANELLI ALTERNATIVI ED ALGEBRE DI COMPOSIZIONE (Alternative Rings and Composition Algebra),
by I. N. Herstein. 1964, 30p
Grants DA-ARO (D)-31-124-G715, NSF-GP-2424
AROD 4197:5
Text in French.

Descriptors: (*Rings (Mathematics), *Algebra), France.

AD-633 927 **Field 12A, 9B**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
MATRIX MANIPULATIONS BY COMPUTER: COMPUTATION OF FUNCTIONS OF A MATRIX.
Technical memo.,
by John Staudhammer. 27 May 66, 38p TM-2891/002/00
Prepared in cooperation with Arizona State Univ., Tempe.

Descriptors: (*Matrix algebra, *Programming (Computers)), (*Functions, Matrix algebra), Numerical analysis, Algorithms.

Identifiers: Cayley-Hamilton theorem.

A program is described for the calculation of functions of numeric matrices. The methods of Krylov and Leverrier are used. The program presented calculates the characteristic equation of the matrix by Krylov's method, then obtains the eigenvalues by finding the roots of this equation. In the enclosed program the method of Muller is used, although any other root-solving routine would work also. Calculations for complex eigenvalues are terminated, since the required complex arithmetic is quite unwieldy and is not included in this program. Such calculations could easily be carried out in FORTRAN IV. For real eigenvalues the function is calculated using the Cayley-Hamilton Theorem for finding the coefficients of the finite expansion of the function in powers of the given matrix. Repeated eigenvalues are also handled by this program, although the resultant numerical accuracy is not very good. The program is not optimized in any way; it is intended for teaching purposes and therefore prints copious intermediate results. A FORTRAN II program, checked on a Philco 2000 ALTAC III compiler, is given here. (Author)

AD-633 928 **Field 12A, 9B**
CFSTI Prices: HC$3.00 MF$0.75
System Development Corp., Santa Monica, Calif.
MATRIX MANIPULATIONS BY COMPUTER: DIRECT NUMERICAL PROCEDURES FOR BASIC MATRIX OPERATIONS.
Technical memo.,
by John Staudhammer. 6 Apr 66, 86p TM-2891/000/00
Prepared in cooperation with Arizona State Univ., Tempe.

Descriptors: (*Matrix algebra, *Programming (Computers)), (*Numerical methods ; procedures, Matrix algebra), Determinant, Simultaneous equations.

This paper describes a set of computer programs that develop a number of reasonably complex routines for determinant evaluation, solution of simultaneous equations, and matrix inversion; the programs are derived from a simple Gauss elimination technique for finding the value of a deteminant. The computer routines illustrate the application of pivot searching to each of the above tasks and are intended to be used as library routines for arbitrarily stored matrices. The bulk of the programs were written in a version of FORTRAN II that is compatible with FORTRAN IV and were checked and compiled on a Philco 2000 (ALTAC III), a CDC 3400, an IBM 7094, a GE 225, and an IBM 1620 (FORTRAN II). The programs are intended as a graded sequence for teaching the principles of efficient programs for matrix manipulations. Each program can be optimized for a given compiler, but such optimization will probably result in programs that will not compile correctly on other computers. The programs thus represent a generally useful set of relatively efficient subroutines. (Author)

AD-633 946 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
Naval Ordnance Test Station, China Lake, Calif.
INTERVAL ESTIMATES FOR RATIOS OF REGRESSION PARAMETERS.
Research rept.,
by Frank C. Reed. May 66, 29p NOTS-TP-4097

Descriptors: (*Statistical analysis, Experimental data), Analysis of variance, Stochastic processes.

Two extensions of the classical estimation of a ratio of two regression parameters are considered. The first extension is concerned with the case in which a number of experiments are performed and each experiment involves a regression function with different regression parameters and different unknown variances of observation. With such assumptions it may turn out that even though the regression parameters for each experiment are different, the ratios of two specified regression parameters for each experiment are the same for all experiments. The first extension provides a method of combining the results of all experiments to obtain an interval estimate for this unknown ratio. The second extension provides a solution to the problem of obtaining simultaneous interval estimates for more than one ration of regression parameters when a single experiment is performed. (Author)

AD-633 988 **Field 12A, 20H**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
LOCAL BEHAVIOR OF STATIONARY GAUSSIAN PROCESSES,
by Michael B. Marcus. Jun 66, 41p P-3375

Descriptors: (*Statistical processes, *Brownian motion), Analysis of variance, Statistical functions.

AD-634 084 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Rand Corp., Santa Monica, Calif.
THE EXISTENCE OF PURE, STATIONARY OPTIMAL POLICIES FOR A CLASS OF MARKOV RENEWAL PROGRAMS,
by Bennett Fox. Jun 66, 8p P-3378

Descriptors: (*Optimization, *Statistical processes), Mathematical programming.

N66-21652 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Innsbruck Univ. (Austria). Inst. for Theoretical Physics.
LIE SERIES SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS.
Administrative rept. no. 1, 1 Jul-31 Dec 65,
by F. Cap. 1966, 9p
Grant NGR-52-046-001
NASA CR-71403

Descriptors: *Coordinate system, *Helmholtz equation, *Partial differential equation, *Lie group.

N66-21777 **Field 12A**
CFSTI Prices: HC$3.00 MF$0.50
North Carolina Univ., Chapel Hill. Computation Center.
RESEARCH STUDY TO DEVELOP METHODS FOR SOLVING PROBLEMS ASSOCIATED WITH SPACE VEHICLES.
Final monthly progress rept.,
by B. G. Woodward. 22 Feb 66, 58p
Contract NAS8-20106
NASA CR-71546

Descriptors: *Algebra, *Trigonometric function, *Algorithm, *Computer program.

N66-22358 **Field 12A**
CFSTI Prices: HC$2.00 MF$0.50
State Univ. of Iowa, Iowa City.
DERIVATION OF MAPPING FUNCTIONS FOR STAR-SHAPED REGIONS,
by K. Rim, and R. O. Stafford. Apr 66, 29p
Grant NsG-576
NASA CR-192 (01)

Descriptors: *Mapping, *Schwarz-Christoffel transformation, *Surface geometry.

N66-22373 **Field 12A**
CFSTI Prices: HC$1.00 MF$0.50
Colorado State Univ., Fort Collins.
AN OPTIMAL PROPERTY OF SEQUENTIAL DECISION PROCEDURES RELATED TO BAYES SOLUTIONS,
by K. Seo. Apr 66, 6p
Grant NsG-569
NASA CR-436

Descriptors: *Decision making, *Sequential analysis.

PB-169 650 **Field 12A**
CFSTI Price: HC$1.60
RAND Corp., Santa Monica, Calif.
ADDITIVE GENERATION OF PSEUDORANDOM NUMBERS,
by O. Gross, and S. M. Johnson. 18 Mar 58, 19p
RM-2132
AD 156 031

Descriptors: (*Pseudo-random systems, Sequences), Monte Carlo method, Stochastic processes.

A pseudorandom sequence of numbers is a completely determined sequence having some of the more easily tested statistical properties of truly random sequences. Such a sequence can be quite useful in applications of random-sampling or Monte Carlo methods, for it can be generated in a computing machine with no extra equipment and with few orders and little storage; besides, it can be tested to guard against departures from mean behavior that can occur in a randomly generated sequence. The cycle lengths of sequences of certain special cases of pseudorandom vectors generated by a new addition technique are calculated to those obtained by the established multiplicative methods. Relevant theorems are included. (Author)

AD-407 624 **See Field 9A**

AD-441 207 **See Field 9D**

AD-441 210 **See Field 9D**

AD-449 821 **See Field 20A**

AD-633 546 **See Field 5C**

AD-633 586 **See Field 20K**

AD-633 596 **See Field 6E**

AD-633 602 **See Field 8J**

AD-633 604 **See Field 8N**

AD-633 613 **See Field 9C**

AD-633 627 **See Field 20D**

AD-633 662 **See Field 20K**

AD-633 739 **See Field 5C**

AD-633 819 **See Field 20K**

AD-633 924 **See Field 6P**

AD-633 932 **See Field 9D**

AD-633 958 **See Field 20D**

AD-633 979 **See Field 20A**

AD-634 090 **See Field 9E**

PB-169 805 **See Field 17G**

12B. OPERATIONS RESEARCH

AD-633 479 **Field 12B**
CFSTI Prices: HC$1.00 MF$0.50
Chicago Univ., Ill. Dept. of Mathematics.
INVESTIGATIONS IN THE THEORY OF RINGS.
Final rept. 1 Oct 63-30 Sep 65,
by I. N. Herstein. 30 Sep 65, 2p
Grant DA-ARO (D)-31-124-G501,
Proj. AROD-4197-M,
AROD 4197:4

Descriptors: (*Rings (Mathematics), Theory).

AD-633 763 **Field 12B**
CFSTI Prices: HC$1.00 MF$0.50
Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
RECIPROCAL OPTIMAL CONTROL PROBLEMS,
by E. Kriendler. Sep 65, 26p RE-227J
Contract AF 49 (638)-1207

Descriptors: (*Optimization, *Control systems), Mathematical programming.

AD-633 861 **Field 12B, 20D, 6C**
CFSTI Prices: HC$4.00 MF$1.00
Illinois Univ., Urbana. Coordinated Science Lab.
QUADRATIC DIFFERENTIAL SYSTEMS FOR MATHEMATICAL MODELS,
by Richard D. Jenks. May 66, 139p Rept. no. R-290
Contract DA-28-043-AMC-00073 (E),
Proj. DA-20014501B31F

Descriptors: (*Mathematical models, (*Nonlinear differential equations), Biology, Molecular beams, Kinetic theory, Gases, Matrix algebra.

This study is concerned with a set of n coupled non-linear differential equations. Such systems suggest mathematical models in almost every branch of the physical sciences where collisions of entities are involved. This paper is essentially in three parts. The first part concerns general n-dimensional systems. Results concerning the existence, uniqueness, and stability of critical points of the above system are given. Certain 'connectedness' concepts are introduced for classification purposes. The second part deals with lower dimensional systems, n=2 and n=3. For n=3, a geometric theory of 'completely positive' systems uncovers a large class of systems which have unique critical points in the interior of the first orthant and which are asymptotically stable in the large. The third part considers a mathematical model for the collision of molecules in a uniform gas. The classical Boltzmann model is discretized by considering the velocity space to be partitioned into a finite number of mutually exclusive regions called 'bins,' each with its own distribution function. This assumption not only greatly simplifies the Boltzmann integro-differential equation but also suggests quadrature methods for numerical evaluation of the Boltzmann integral. (Author)

AD-633 912 **Field 12B, 15G**
CFSTI Prices: HC$2.00 MF$0.50
System Development Corp., Santa Monica, Calif.
STOCHASTIC DUELS WITH TIME-OF-FLIGHT INCLUDED.
Professional paper,
by C. J. Ancker Jr. 19 May 66, 31p SP-1017/009/00
Presented at the National Meeting of the Operations Research Society of America (29th), 19 May 1966, Santa Monica, California.

Descriptors: (*Game theory, *Stochastic processes), (*Target acquisition, Time), Projectiles, Kill probabilities.

Identifiers: Stochastic duels.

The fundamental duel in the Theory of Stochastic Duels is extended to include projectile time-of-flight. As a preliminary, the marksman firing at a passive target is studied. Two firing procedures are assumed. In one, refiring proceeds as rapidly as possible, whereas in the other the duelist delays until he observes the effect of each round. Both fixed (discrete) and continuous (random) firing-times are considered. Also included is the case where time-of-flight varies uniformly with elapsed time. General solutions and examples are given. The analysis indicates in a quantitative way how time-of-flight may radically influence the outcome. (Author)

AD-634 087 **Field 12B, 14A**
CFSTI Prices: HC$2.00 MF$0.50
Columbia Univ., New York. School of Engineering and Applied Science.
A PRIMAL METHOD FOR MINIMAL COST FLOWS WITH APPLICATIONS TO THE ASSIGNMENT AND TRANSPORTATION PROBLEMS.
Technical rept.,
by Morton Klein. 1 Jun 66, 33p TR-32
Contract Nonr-266 (55)
Proj. NR-042-099

Descriptors: (*Linear programming, *Cost effectiveness), Algorithms, Operations research, Transportation, Scheduling.

A simple procedure is given for solving minimal cost flow problems in which feasible flows are maintained throughout. It specializes to give primal algorithms for the assignment and transportation problems. Convex cost problems can also be handled. (Author)

PB-169 658 **Field 12B**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
A RESOURCE ALLOCATION PROBLEM IN CONTINUOUS FORM,
by W. H. Fleming. 16 Feb 55, 21p RM-1430
AD 86 710
Microfilm available from DDC.

Descriptors: (*Scheduling, Optimization), Mathematical programming.

The solution of a simple optimal resource allocation problem is found using general methods recently developed by Bellman, Fleming, and Widder.

PB-169 660 **Field 12B**
CFSTI Price: HC$2.60
RAND Corp., Santa Monica, Calif.
NOTES ON LINEAR PROGRAMMING: PART I. THE GENERALIZED SIMPLEX METHOD FOR MINIMIZING A LINEAR FORM UNDER LINEAR INEQUALITY RESTRAINTS,
by George B. Dantzig, Alex Orden, and Philip Wolfe.5 Apr 54, 23p RM-1264
AD 114 134

Descriptors: (*Linear programming, Optimization), Inequalities.

Identifiers: Simplex method.

The determination of 'optimum' solutions to systems of linear inequalities has assumed increasing importance as a tool for mathematical analysis of certain problems in economics, logistics, and the theory of games. This paper develops a theory for avoiding assumptions regarding rank of underlying matrices which has import in applications where little or nothing is known about the rank of some linear inequality system requiring solution. (Author)

AD-633 594 **See Field 9E**

AD-633 609 **See Field 9E**

AD-633 893 **See Field 20N**

AD-633 914 **See Field 15E**

AD-633 975 **See Field 9C**

AD-634 001 **See Field 5A**

AD-634 106 **See Field 5H**

AD-634 122 **See Field 9C**

13A. AIR CONDITIONING, HEATING, LIGHTING, AND VENTILATING

AD-633 494 **Field 13A**
CFSTI Prices: HC$1.00 MF$0.50
Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Aeronautical Engineering and Astronautics.
FINAL REPORT.
Apr 66, 10p TR-AE-6601
Contract DA-31-124-ARO (D)-318,
Proj. DA-20014501B33G
AROD 5641:2
See also AD-624 147.

Descriptors: (*Energy management, Feasibility studies), Flow separation, Turbines, Compressors.

AD-633 916 **Field 13A, 13M**
CFSTI Prices: HC$5.00 MF$1.00
Florida Univ., Gainesville. Engineering and Industrial Experiment Station.
AIR DISTRIBUTION IN A MULTI-ROOM SHELTER USING A PACKAGE VENTILATION KIT.
Final rept.,
by D. W. Taylor, and Juan O. Gonzalez Jr. 15 Jul 65, 162p
Contract OCD-PS-65-17,
Proj. 1200,
Task 1210
PSDC.FB TR-17

Descriptors: (*Ventilation, *Shelters), Air, Distribution, Effectiveness, Temperature, Pumps.

The report covers ventilation studies to determine the suitability of a Package Ventilation Kit (PVK) to adequately ventilate an adiabatic, compartmented, simulated protective shelter. Individual simulated occupants were used. Conditioned ventilation air at the 1% high design day (Springfield, Va.) was delivered to the shelter at varying rates and thermal responses for shelter and individual rooms measured. A habitable thermal environment, as measured by 85 deg. ET maximum, could not be maintained in all of the shelter rooms through a complete diurnal cycle in supply or exhaust at any ventilation rate tested (8 to 25 cfm per occupant) without auxiliary air moving devices (Punkah Pumps). At criterion 85 deg ET average, diurnal cycle, the entire shelter could be adequately ventilated by the PVK (exhaust) at 14 cfm per occupant with Punkah Pumps. For these same conditions with PVK as an air supply 16 cfm were required. Side rooms at diurnal cycle exceeded average 85 deg. ET for all ventilation rates with Punkah Pumps. (Author)

PB-169 242 **Field 13A, 20M**
CFSTI Prices: HC$4.00 MF$1.00
Washington Univ., Seattle. Coll. of Engineering.
MECHANISMS FOR INCREASING THE PEAK HEAT FLUX IN BOILING SATURATED WATER AT ATMOSPHERIC PRESSURE,
by Ward J. Frea Jr., and C. P. Costello.Jun 63, 140p
Grant NSF-GP-788

Descriptors: (*Nucleate boiling, Heat), (*Boiling, Heat transfer), (*Heat transfer, Boiling), Heaters, Surface properties, Geometric forms, Temperature, Deposits, Water.

The effect of non-hydrodynamic mechanisms on the peak heat flux in a boiling system are critically appraised. Results obtained by requiring the liquid supply to flow through fiberglass wicking in order to reach the heater surface are assessed. Heater surface characteristics and heater geometry were varied and their influence analyzed. Heat flux versus temperature measurements for the experiments conducted in this study are included. Surface characteristics were modified by first utilizing heaters coated with mineral deposits and then employing heaters with clean, undeposited surfaces. Cylindrical and semi-cylindrical heater geometries were tested. It is concluded that wide variations in the peak heat flux, not predicted by purely hydrodynamic theories, are produced by the alterations that were studied in this investigation. (Author)

AD-459 461 **See Field 6R**

13B. CIVIL ENGINEERING

AD-633 511 **Field 13B, 18C, 13M**
CFSTI Prices: HC$2.00 MF$1.25
Army Engineer District, Fort Worth, Tex.
CONSTRUCTION TECHNIQUES AND COSTS FOR UNDERGROUND EMPLACEMENT OF NUCLEAR EXPLOSIVES.
Preliminary rept.,
by W. J. Samuelson, J. L. Hair, and P. R. Fisher.
Aug 65, 216p
AEC PNE-5004P

Descriptors: (*Nuclear industrial applications, *Civil engineering), (*Underground structures, Civil engineering), Drills, Drilling, Costs, Underground explosions, Nuclear explosions, Construction, Mining engineering, Earth handling equipment, Structures, Supports.

The report describes the equipment, methods, and costs that are considered feasible for constructing underground emplacements for nuclear explosives such as would be used in nuclear excavation. The text of the report discusses the available methods and techniques currently being used in 'big hole' (36-inch diameter and larger) drilling, tunneling, and conventional shafting. The technical data have been collected from the available literature as well as by personal contacts with the Government agencies and private industries concerned. Big hole drilling methods can be divided into four types: churn drilling, auger drilling, calyx drilling, and rotary drilling. Of these, auger drilling is the most economical for holes to depths of 150 feet in soft material, and rotary drilling is by far the most popular choice for depths in excess of 150 feet. Discussions concerning mining and shafting cover the conventional cyclic method of drilling and blasting as well as the mechanical mining methods, which in the past few years have gained considerable popularity. Cost analyses for big hole drilling are included in Appendix A and analyses for tunneling and shafting are included in Appendix B.

AD-633 905 **Field 13B**
CFSTI Prices: HC$3.00 MF$0.75
System Development Corp., Santa Monica, Calif.
THE DEVELOPMENT AND VALIDATION OF A DIGITAL SIMULATION MODEL FOR DESIGN OF FREEWAY DIAMOND INTERCHANGES.
Professional paper,
by A. V. Gafarian, E. Hayes, and W. W. Mosher Jr. 5 Apr 66, 98p SP-2159/000/00
Presented at the National Meeting of the Operations Research Society of America (29th), May 18-20, 1966, Santa Monica, California.

Descriptors: (*Traffic, Simulation), (*Roads, Design), Mathematical models, Digital computers, Geometric forms.

Identifiers: Freeways, Freeway interchanges.

The principal goal of the project is to develop a valid general-purpose simulation model of a diamond interchange for traffic between a freeway and an arterial street. The existence of such a model will enable the traffic engineer to study the effects of alternative geometric and control configurations on diamond interchange operations. The principal emphasis of this study is on the validation problem. To validate the model efficiently, the complete interchange is separated into components, one of which, for example, is the merging of an on-ramp with the freeway. A computer model is then designed for that component, and its performance (when the parameters are properly set) is compared with that of existing real operations. If realistic performance is obtained, the next component of the interchange is then added; otherwise, indicated modifications of the model are made and again compared with field data. This iterative process is continued until validation is achieved for the entire interchange model. An account is given of the work accomplished to date. This includes a complete description of the first version of Model 1, the merging of an on-ramp with the freeway. This model, as well as its data reduction program, has been programmed, debugged, and is running. Some of the results obtained with it are described, as are the results of the preliminary validation study. (Author)

AD-634 069 **Field 13B, 5A, 8F**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio. Remote Area Conflict Information Center.
WATER PROBLEMS OF THE MIDDLE EAST,
by J. R. Irwin, and J. A. Eibling. 17 Jun 66, 46p
BAT-171-38
Contract SD-171

Descriptors: (*Water supplies, *Middle East), Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Saudi Arabia, Personnel, Training, Management planning, Costs, Effectiveness.

The water resources of the Middle East (including specifically the United Arab Republic, Iran, Iraq, Israel, Jordan, Lebanon, and Saudi Arabia) and the management, development, and utilization of the water resources are discussed in this report. Also considered is the adverse effect of shortages

of trained personnel and of illiteracy on the effectiveness of the existing water-resources programs. Establishment of a Middle East Water Institute is recommended. (Author)

PB-169 943 **Field 13B, 13F**
CFSTI Prices: HC$4.00 MF$0.75
Virginia Dept. of Highways. Div. of Traffic and Planning.
TRAVEL SURVEY OF OUT-OF-STATE PASSENGER CARS USING HIGHWAYS IN VIRGINIA.
1964, 104p
Prepared in cooperation with Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Virginia), (*Virginia, Traffic), (*Passenger vehicles, Traffic), Roads.

Identifiers: Highways; Traffic engineering.

In 1964, 42,530,000 persons traveling in 19,283,000 out-of-state passenger cars spent $288,027,000 in Virginia. About 3,843,000 of these persons were commuting to and from places of regular employment within the State, and 38,687,000 were visiting Virginia on either pleasure trips, business trips, or combined business and pleasure trips. Of all 1964 visitors to Virginia, excluding commuters, 30 per cent of all car parties spent one or more nights in the State while 70 per cent left the State without spending the night. Considering the group which did spend one or more nights in Virginia, 63 per cent used motel accommodations, 30 per cent stayed with friends and relatives, 3 per cent used hotels, 3 per cent used trailer or camping facilities, and 1 per cent stayed at tourist homes. While the total number of out-of-state visitors has increased substantially since the last travel study year, 1959, the average amount of time spent in the State and average dollar expenditures made (by both per person and per car party comparisons) have declined slightly. Of all out-of-state visitors in Virginia, 1964, the group on business trips accounted for 34 per cent of all dollar expenditures; persons on pleasure trips accounted for 63 per cent; the combined business and pleasure group, 2 per cent; and commuters made 1 per cent of all the total dollar expenditures by out-of-state visitors in 1964.

PB-170 362 **Field 13B, 11C**
CFSTI Prices: HC$3.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
USE OF RADIOISOTOPES IN DEVELOPMENT OF TEST METHODS AND FORMULATIONS FOR TRAFFIC PAINTS. PART I. HIGHWAY CROSS-STRIPE TESTS OF TRAFFIC PAINTS, SERIES I.
Final technical rept.,
by W. R. Tooke Jr., and W. H. Burrows. 30 Sep 65, 63p
Proj. B-210
See also PB-170 363.

Descriptors: (*Paints, *Roads), Traffic, Safety, Radioactive isotopes, Test methods, Measurement, Thickness, Erosion, Wear resistance, Performance (Engineering).

A laboratory abrasion wear test was developed but it could not be used as a reliable measure of road performance because of the complicated interplay of chipping and erosion which actually govern paint failure in service. Various paint formulations were developed and evaluated in order to obtain improved paint performance but none showed startling advantages over formulations now available or in general use. Radioisotope measurements by means of a backscatter thickness gage were not found to be a convenient or reliable means for measuring the dry film thickness of highway paints in situ. (Author)

PB-170 363 **Field 13B, 11C**
CFSTI Prices: HC$3.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
USE OF RADIOISOTOPES IN DEVELOPMENT OF TEST METHODS AND FORMULATIONS FOR TRAFFIC PAINTS. PART II. HIGHWAY CROSS-STRIPE TESTS OF TRAFFIC PAINTS, SERIES II AND III.
Final technical rept.,
by W. R. Tooke Jr., and W. H. Burrows. 30 Sep 65, 67p
Proj. B-210
See also PB-170 362.

Descriptors: (*Paints, *Roads), Traffic, Safety, Radioactive isotopes, Test methods, Measurement, Thickness, Erosion, Wear resistance, Performance (Engineering).

PB-170 364 **Field 13B, 11C**
CFSTI Prices: HC$4.00 MF$0.75
Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
USE OF RADIOISOTOPES IN DEVELOPMENT OF TEST METHODS AND FORMULATIONS FOR TRAFFIC PAINTS. PART III. LABORATORY WEAR TESTING OF TRAFFIC PAINTS.
Final technical rept.,
by W. R. Tooke Jr., and W. H. Burrows. 30 Sep 65, 109p
Proj. B-210
See also PB-170 363.

Descriptors: (*Paints, *Roads), (*Wear resistance, Paints), Traffic, Safety, Radioactive isotopes, Test methods, Measurement, Erosion, Abrasives, Adhesion, Test equipment, Performance (Engineering).

Contents: Highway Test Correlation and Substrate Effects; Property Characterization - Performance Relations of Paints; Theoretical Studies; Wear Tester Design; Exploratory Experiments; Testing Procedures; Test Results and Observations; Highway Service Correlations; Test Substrate; Paint and Beading Application and Measurement; Mechanical Features of Accelerated Wear Tester; Environmental Cycling and Speed Control; Wear Tester Design and Testing Concepts; Development of Standardized Operating Conditions; Paints; Description of Experiments; Disc Preparation Procedures; Test Results and Data Reduction; Correlation and Analysis; Physical Characterization tests; Theoretical Aspects of Traffic Paint Performance -- Abrasion-Erosion; Adhesion-Chipping; Interpretation of Test Data.

PB-170 365 **Field 13B, 13F, 5H, 5E**
CFSTI Prices: HC$5.00 MF$1.00
Ohio State Univ., Columbus. Engineering Experiment Station.
DRIVER-AUTOMOBILE INTERFACES,
by Robert Earl Fenton. Aug 65, 156p Rept. no. 202A-7

Descriptors: (*Traffic, Control systems), (*Motor vehicle operators, Man-machine systems), (*Man-machine systems, Motor vehicle operators), (*Vehicles, Control systems), Effectiveness, Performance (Human), Automatic, Engineering, Simulation, Statistical analysis, Operation, Velocity, Roads, Passenger vehicles.

Identifiers: Traffic engineering.

The quality of high-speed, high-density traffic flow may be improved by use of an automatic system for the longitudinal control of vehicles in a traffic stream. However, such a system must include a manual mode, so that a driver can, if necessary, quickly regain and keep control of his vehicle. Additionally, an improved man-machine interface must be designed for nonequipped vehicles, so that their performance approximates that of a vehicle equipped with an automatic system. This work is devoted to the determination of such an improved man-machine interface, which may be used in both equipped and nonequipped vehicles. A tactile aiding device, or finger, was built into the head of a control stick, the finger position giving the driver an accurate indication of his state with respect to a lead vehicle. This control device was tested in both a normal and a difficult simulated car-following situation, and the results compared with those obtained using a conventional set of automobile controls in similar situations. It appears that substantial improvements in car following may be obtained by using the tactile controller, and that it may be used both as the manual mode of an automatic system and as the primary control in an unequipped vehicle. However, the final decision may be drawn only after real-world testing.

PB-170 366 **Field 13B, 13L**
CFSTI Prices: HC$6.00 MF$1.25
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
WARRANTS FOR HIGHWAY-HIGHWAY GRADE SEPARATIONS PROJECTS: AN ANNOTATED BIBLIOGRAPHY.
Aug 65, 224p Rept. no. 0340
Prepared in cooperation with Illinois Div. of Highways and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Traffic, Engineering), (*Bibliographies, Roads), (*Roads, Design), Construction, Abstracts, Control, Economics, Civil engineering, Maintenance, Motor vehicle accidents.

Identifiers: Highway engineering, Traffic engineering.

This bibliography contains annotated references pertinent to a study of interchange and grade separation warrants. The references deal with grade separation design standards and operation, control, time costs, vehicle operation, accidents, road construction and maintenance, methods of economic analysis, highway impact studies, trip generation, distribution and assignment, land use planning and intersection simulation models. (Author)

PB-170 368 **Field 13B, 6P, 5E**
CFSTI Prices: HC$2.00 MF$0.50
Ohio State Univ., Columbus,. Engineering Experiment Station.
VISUAL MOTION THRESHOLDS FOR SIMULATED NIGHT DRIVING,
by Robert E. Fenton, and Ernest P. Todosiev. Apr 65, 43p Rept no. 202A-6

Descriptors: (*Motor vehicle operators, *Vision), Adaptation (Physiology), Thresholds (Physiology), Acceleration, Velocity, Night sky, Simulation, Fatigue (Physiology), Visual perception, Motion, Traffic, Equations, Passenger vehicles, Motor reactions, Mathematical analysis.

The experimental investigation of the driver's visual motion threshold for simulated night driving has yield two sets of invariant threshold equations. One set interrelates the acceleration threshold, presentation time and simulated headway. The corresponding angular velocity thresholds were compared with values obtained in an actual driving situation and some rough correlation between the simulated and real world data was observed. (Author)

PB-170 602 **Field 13B, 13L, 14C**
CFSTI Prices: HC$3.00 MF$0.75
Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ACCIDENT SENSING AND SURVEILLANCE SYSTEM.
Final rept., phase 1,
by I. L. Stillman. Oct 65, 77p CAL-YB-1957-X-1
Contract CPR-11-0956

Descriptors: (*Motor vehicle accidents, Electronic recording systems), (*Electronic recording systems, Motor vehicle accidents), Traffic, Safety, Video networks, Identification, Models (Simulations), Feasibility studies, Television communication systems, Noise, Roads.

Identifiers: Highway engineering.

A study was made to determine the feasibility of an accident sensing and surveillance system to be used to record on video tape, events leading up to and including a motor vehicle collision at urban intersections. A laboratory model of the system was designed and evaluated. The system consists of two virtually independent subsystems - a detection-discrimination system and a surveillance-storage system. The detection-discrimination system is designed to identify those sounds associated with motor vehicle crashes, while disregarding other sounds common to urban intersection environments. The surveillance-storage system consists of a pair of continuously operating, narrow bandwidth television systems and two magnetic tape units. The television system's video signals are continuously recorded on one tape unit containing a tape loop. When a detect signal is received from the detection-discrimination system, the information is read from the tape loop and rerecorded on a permanent storage tape for later analysis. The laboratory model of the system operating at 15 frames per second demonstrated a capability of televising and recording the image of an automobile 230 feet from the center of an intersection with a resolution permitting a measurement of its instantaneous position to within plus or minus 5 feet. (Author)

AD-633 639 See Field 6R

AD-633 740 See Field 8M

AD-633 802 See Field 8M

PB-169 713 See Field 5C

PB-169 944 See Field 5C

PB-170 043 See Field 5C

PB-170 102 See Field 5C

PB-170 229 See Field 5C

PB-170 241 See Field 5C

PB-170 244 See Field 5C

PB-170 247 See Field 5C

PB-170 252 See Field 5C

PB-170 253 See Field 5C

PB-170 283 See Field 5C

PB-170 307 See Field 5C

PB-170 308 See Field 5C

PB-170 334 See Field 5C

PB-170 338 See Field 5C

PB-170 361 See Field 13C

PB-170 367 See Field 11B

PB-170 568 See Field 5C

13C. CONSTRUCTION EQUIPMENT, MATERIALS, AND SUPPLIES

PB-170 361 Field 13C, 8G, 13B, 8F
CFSTI Prices: HC$2.00 MF$0.50
North Carolina State Univ., Raleigh. School of Engineering.
AN ANNOTATED BIBLIOGRAPHY ON INDIGENOUS MATERIALS FOR HIGHWAY CONSTRUCTION,
by E. W. Gray Jr., Ching-Feng Chen, and W. G. Mullen. Mar 66, 38p 0480
Proj. ERD-110-P-2
Rept. on Exploration of Methods to Determine the Optimum Use of Indigenous Materials for Highway Construction. Prepared in cooperation with the North Carolina State Highway Commission and Bureau of Public Roads, Washington, D. C.

Descriptors: (*Bibliographies, Materials), (*Materials, Roads), (*Natural resources, North Carolina), Engineering geology, Construction, Soils, Rock (Geology), Identification, Classification, Civil engineering.

Identifiers: Highway engineering.

The report contains a list of 165 annotated references which have been grouped under the following five general headings: Identification and classification of highway construction materials, determination of the availability of highway construction materials, determination of the specific engineering characteristics of highway construction materials, improvement of engineering characteristics of highway construction materials, relation of design considerations to highway construction materials.

AD-634 074 See Field 11B

C13.29/2:2 See Field 11B

PB-170 367 See Field 11B

PB-170 509 See Field 5C

13D. CONTAINERS AND PACKAGING

AD-634 004 Field 13D, 9A
CFSTI Prices: HC$3.00 MF$0.75
Battelle Memorial Inst., Columbus, Ohio.
ELECTRONIC PACKAGING: A BIBLIOGRAPHY,
by J. W. Klapheke, W. H. Veazie, J. C. Holt, and J. L. Easterday. Mar 66, 90p
Contract DA-01-021-AMC-11706 (Z)
RSIC 534

Descriptors: (*Packaging, Electronic equipment), Bibliographies, Abstracts, Space environmental conditions, Indexes.

The annotated bibliography of selected reports, journal articles, and manufacturers' literature on electronic packaging provides a literature basis for electronic packaging engineers to design more reliable, maintainable, and adaptable electronic equipment for aerospace application. The literature search of abstract publications, published bibliographies, specialized information centers and services, and computer searches by Restone Scientific Information Center and Defense Documentation Center resulted in the 476 abstracts in this bibliography which were selected from an initial review of approximately 3,000 articles. Subject indexing is provided by properties and environmental effects on packaging materials, discrete parts to module packaging, integrated circuits to module packaging, module packaging to assembly, housing and mounting, packaging products, and interconnection techniques. Author and corporate author indexes are included. (Author)

AD-633 639 See Field 6R

AD-633 765 See Field 20D

AD-634 115 See Field 13F

13E. COUPLINGS, FITTINGS, FASTENERS, AND JOINTS

N66-21730 Field 13E
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
LOW TEMPERATURE MECHANICAL PROPERTIES OF HIGH STRENGTH. A-286 BOLTS,
by J. W. Montano. 9 Mar 66, 34p NASA-TM-X-53407

Descriptors: *Mechanical property, *Bolt, *High strength alloy, *Low temperature environment.

AD-633 895 See Field 11A

13F. GROUND TRANSPORTATION EQUIPMENT

AD-469 165 Field 13F
CFSTI Prices: HC$1.10 MF$0.50
Army Foreign Science and Technology Center, Washington, D. C.
HERCULES OF THE SNOW OCEAN,
by A. Mironov. Jul 65, 6p FSTC-381-T65-321
Proj. G7-1050
TT 66-61249
Trans. from Krasnaya Zvezda (USSR) 13 Mar 1965

Descriptors: (*Snow vehicles, USSR).

AD-633 880 Field 13F, 13J
CFSTI Prices: HC$4.00 MF$0.75
Selwood Research, Inc., Kensington, Md.
TEST MANUAL FOR ENGINEERING WATER TESTING OF HIGH SPEED AMPHIBIOUS VEHICLES
Final rept., 21 Jun-1 Oct 65,
by John L. B. Selwood, and Alexander W. Fowler. 22 Apr 66, 126p Rept. no. 104-002
Contract Nonr-5016 (00),
Proj. NR-062-375

Descriptors: (*Hydrofoils, Tests), (*Amphibious vehicles, Tests), Instruction manuals, Handbooks, Marine Corps, Performance (Engineering), Water, Ship hulls.

The test handbook is concerned with the tests of the LVW, LVH1, LVH2, ARCK, the LVK and their successors all of which can exceed a speed of 25 knots.

AD-633 966 Field 13F, 1E, 15E
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
CARGO LOADING EQUIPMENT.
Final rept.
6 Jun 66, 8p
Proj. 51-66-07

Descriptors: (*Cargo vehicles, Terminal flight facilities), (*Air transportation, Cargo), (*Terminal flight facilities, Cargo), Marine corps, Logistics, Handling, Cost effectiveness.

Identifiers: MACL-1 Cargo loaders.

Conclusions. The requirement to load and off-load cargo from Marine Corps KC-130 aircraft can be accomplished by either the Model 2161 or the MACL-1 Loaders. (b) This requirement can be fulfilled by the MACL-1 at a lower system cost in dollars and manpower. (c) The MACL-1 is more suitable for Marine Corps use in the expeditionary environment. Recommendation. Procurement of the MACL-1 is recommended.

AD-634 115 Field 13F, 15E, 21D, 13D
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
LIQUID TRANSPORTERS.
Interim rept.,
15 Jun 66, 11p Rept. no. 1R-1
Proj. 45-64-03

Descriptors: (*Fuel trucks, Tactical warfare), (*Modification kits, Fuel trucks), (*Fuel tanks, Expandable structures), Cargo vehicles, Trailers, Fuels, Liquids, Helicopters, Marine corps, Logistics.

Identifiers: M-127 Trailers (12-ton).

Conclusions: (a) The M-127 Fuel Transporter Adapter Kit provides a satisfactory means of converting the M-127 cargo trailer into a fuel transporter for the explicit purpose of transferring fuel from the AAFS to the TAFDS or any other single dispensing point. (b) The kit is unsatisfactory for transporting partial loads of fuel as would be encountered if the unit were used to dispense fuel at a series of locations. (c) The 3,000-gallon tank is satisfactory for use as a short term ground container. (d) All allowances of the subject item should be held by the Bulk Fuel Companies (T/E M-3333) at the rate of 15 kits per unit. Recommendations: The M-127 Fuel Transporter Adapter Kits should be procured in sufficient quantities to provide an allowance of 15 kits per Bulk Fuel Company. (Author)

AD-633 698 See Field 1C

AD-633 862 See Field 1C

PB-169 943 See Field 13B

PB-170 365 See Field 13B

13G. HYDRAULIC AND PNEUMATIC EQUIPMENT

AD-633 689 **Field 13G, 20D, 9E**
CFSTI Prices: HC$3.00 MF$0.75
Case Inst. of Tech., Cleveland, Ohio.
FLUERICS (FLUID AMPLIFICATION). 18. A FLUID-STATE DIGITAL CONTROL SYSTEM.
Doctoral thesis,
by Ralph O. Turnquist. 2 Feb 66, 66p
Contract DA-49-186-AMC-79 (D),
Projs. DA-1P010501A001, HDL-31100

Descriptors: (*Fluid amplifiers, *Digital-to-analog converters), Fluid mechanics, Control systems, Servomechanisms, Digital systems.

Identifiers: Fluerics, Fluid control devices.

The design and development of a digital-to-analog (D/A) converter suitable for use in fluid-state digital control systems are described. Design considerations are discussed, and theoretical static and dynamic analyses are presented. Experimental static and dynamic test results are also included. The design of input data handling techniques suitable for fluidstate digital control systems is described. These techniques include a counter preset device for applying step inputs and a synchronizer necessary when applying ramp inputs. Models of both devices performed satisfactorily. The D/A converter and input data handling devices were combined with an existing quantizer, bidirectional counter, preamplifier, power amplifier, and prime mover to form a prototype digital pulse-data control system. An analysis of the effect of system parameters on performance is presented. Experimental test results are also included. A relatively simple digital lead compensation scheme was implemented. Experimental test results showed that this type of compensation can be used effectively to stabilize fluid-state digital control systems. (Author)

N66-22230 **Field 13G**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
COSMOGENIC RADIONUCLIDES IN THE BONDOC METEORITE,
by P. J. Cressy Jr. 12 Apr 65, 9p NASA-TM-X-56419

Descriptors: *Mass spectrometry, *Radioactive nuclide, *Bondoc meteorite.

13H. INDUSTRIAL PROCESSES

AD-633 512 **Field 13H, 11F**
CFSTI Prices: HC$6.00 MF$1.50
Battelle Memorial Inst., Columbus, Ohio.
DEFORMATION PROCESSING OF PRECIPITATION-HARDENABLE STAINLESS STEELS,
by D. E. Strohecker, A. F. Gerds, and F. W. Boulger. Oct 65, 277p
Contract DA-01-021-AMC-11651 (Z)
NASA TM-X-53431, RSIC 495

Descriptors: (*Stainless steel, *Material forming), State-of-the-art reviews), Deformation, Rolling (Metallurgy), Extrusion, Forging, Drawing (Machine processing), Mechanical working, Pipes, Rods, Wire, Hardening, Machine tools.

The report covers the state of the art of both primary and secondary fabrication methods for the precipitation-hardenable stainless steels. Methods currently employed for primary fabrication of these alloys include rolling, extrusion, forging, and drawing of tube, rod, and wire. Secondary metal-forming operations are those processes that produce finished or semifinished parts from sheet, bar, or tubing using additional metalforming operations. The following secondary forming processes are discussed: brake bending, deep drawing, spinning and shear forming, drop hammer, trapped rubber, stretch, roll forming, dimpling, joggling, and sizing. Equipment and tooling used for the various operations are discussed and illustrated wherever possible. (Author)

AD-633 513 **Field 13H, 11F**
CFSTI Prices: HC$6.00 MF$1.25
Battelle Memorial Inst., Columbus, Ohio.
DEFORMATION PROCESSING OF NICKEL-BASE AND COBALT-BASE ALLOYS,
by D. E. Strohecker, T. G. Byrer, A. F. Gerds, J. H. Gehrke, and F. W. Boulger. 18 Apr 66, 239p
Contract DA-01-021-AMC-11651 (Z)
NASA TM-X-53439; RSIC 479

Descriptors: (*Nickel alloys, *Material forming), (*Cobalt alloys, *Material forming), Deformation, State-of-the-art reviews, Rolling (Metallurgy), Extrusion, Cold working, Forging, Drawing (Machine processing), Mechanical working, Pipes, Machine tools, Rods, Wire, Corrosion-resistant alloys.

The report covers the state of the art of both primary and secondary fabrication methods for the nickel-and cobalt-base alloys. Methods currently employed for primary fabrication of these alloys include rolling, extrusion, forging, and drawing of tube, rod, and wire. Secondary metal-forming operations are those processes that produce finished or semifinished parts from sheet, bar, or tubing using additional metal-forming operations. The following secondary forming processes are discussed: brake bending, deep drawing, spinning and shear, drop hammer, trapped rubber, stretch, tube, roll, dimpling, joggling, and sizing. Equipment and tooling used for the various operations are discussed and illustrated wherever possible. (Author)

AD-633 643 **Field 13H, 18J, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
SOME POSSIBILITIES OF METHOD OF EDDY CURRENTS FOR MULTIPARAMETER CHECKING OF ELEMENTS OF CONSTRUCTIONS,
by V. G. Vyakhorev, V. G. Gerasimov, V. P. Deniskin, L. I. Trakhtenberg, and Yu. M. Shkarlet.
28 Jan 66, 23p FTD-MT-65-563
TT 66-61395
Edited machine trans. of mono. Nekotorye Vozmozhnosti Metoda Vikhrevykh Tokov Dlya Mnogoparametrovogo Kontrolya Elementov Konstruktsii, 1965 26p.

Descriptors: (*Non-destructive testings, *Magnetic fields), (*Reactor materials, Non-destructive testing), Reliability, USSR, Defects (Materials), Transducers.

The report contains the results obtained in connection with the application of the method of eddy currents for multiparameter checking in certain areas of nuclear technology.

AD-633 697 **Field 13H, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
DEFECTOSCOPY OF THIN-WALLED TUBES,
by V. V. Gorskii, V. M. Zakharov, G. A. Nikitin, V. K. Popov, and V. T. Pronyakin. 16 Feb 66, 35p FTD-MT-65-562
TT 66-61411
Edited machine trans. of mono. Simpozium po Ispytaniyam Bez Razrusheniya v Yadernoi Tekhnologii Bukharest, Rumania, May 17-21 1965 p1-30.

Descriptors: (*Non-destructive testing, *Pipes), (*Ultrasonic radiation, Non-destructive testing), Defects (Materials), Magnetic fields, USSR.

Identifiers: Lamb wave techniques.

Along with standard methods of checking and testing tubes, ultrasound and eddy currents are widely applied at present for detection of hidden defects (cracks, nonmetallic inclusions, stratifications, blisters) and deep notches and scratches on the internal surface of the tube, for the determination of dimension of grains, and for the measurement of wall thickness and corrosion of samples during autoclave tests. The conducted investigations and accumulated experience show that ultrasonic flaw detectors are more sensitive to small internal defects and notches on the surface of tubes than eddy current equipment. The latter basically is used for measuring the thickness of tube walls and samples during corrosion tests. In the report certain questions of the theory of ultrasonic defectoscopy of thin-walled tubes are considered and a description of defectoscopy equipment now applied is given. (Author)

AD-633 873 **Field 13H, 14B**
CFSTI Prices: HC$4.60 MF$0.50
Southwest Research Inst., San Antonio, Tex.
DEVELOPMENT OF A TEST DEVICE UTILIZING A PRACTICAL NONDESTRUCTIVE TEST TECHNIQUE TO DETECT FATIGUE DAMAGE IN METALS AND ALLOYS.
Final rept., 15 May 61-15 Jun 62,
by Felix N. Kusenberger, John R. Barton, Wray J. Fogwell, and Herman F. Barsun. 15 Jun 62, 44p
Contract NOw-61-0685-c

Descriptors: (*Non-destructive testing, *Steel), (*Pipes, Non-destructive testing), (*Ultrasonic radiation, Non-destructive testing), Fatigue (Mechanics), Test Equipment, Coils, Magnetic fields, Hall effect.

Nondestructive magnetic field inspection techniques were evaluated for the detection of fatigue damage in steel tubing. Methods of magnetizing the specimens as well as methods for measuring magnetic field perturbations were investigated. Design and evaluation of an ultrasonically driven search coil type probe for measuring field perturbations are described. This probe and a solenoid type magnetizing coil were evaluated using a specimen containing manufactured defects as well as specimens which were stress cycled. A pronounced signal change was obtained on a stress cycled specimen prior to the propagation of a visible crack. A smooth increase of signal amplitude with increasing stress cycles was observed. Many examples of the inspection records and a discussion of the results obtained are given. The probe

and magnetizing techniques were incorporated into the design of a semi-automatic experimental device for detecting fatigue damage in steel tubing. Fabrication, assembly, and initial operational evaluation of the device have been completed. A photograph and description of the device are presented. (Author)

AD-634 031 **Field 13H, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Army Materials Research Agency, Watertown, Mass. Materials Technology Div.
ANISOTROPY AND ITS RELATIONSHIP TO DEEP DRAWING OF A 5% Cr TOOL STEEL (H11).
Technical rept.,
by Robert M. Colton, and James D. Colgate. Apr 66, 26p
AMRA TR-66-08

Descriptors: (*Tool steel, *Drawing (Machine processing)), (*Anisotropy, Drawing (Machine processing)), Rolling (Metallurgy), Temperature, Annealing, Ductility, Transition temperature, Brittleness, Strain (Mechanics), Chromium alloys.

Identifiers: Steel H-11.

The drawability of a spheroidize-annealed hot-rolled H11 tool steel is shown to be most critically dependent upon hot-rolling finishing temperature, spheroidize-annealing treatment, and subsequent deep-drawing temperature. These processing variables influence drawability as indicated by their effect upon strain ratio (R sub theta = d epsilon sub w/ d epsilon sub t) measured at an angle delta to the rolling direction, the average normal anisotropy (R'), the degree of planar anisotropy (delta R) and susceptibility to 'earing', and the brittle-ductile transition temperature. Drawability is shown to increase as R' increases. However, R', delta R, and R (sub 45) are shown to be linearly related. As drawability increases (R' > 1), susceptibility to earing also increases (/delta R/>0). Values of R', delta R, R sub theta, yield strength, ductility, and brittle-ductile transition temperatures for optimum drawability are presented. (Author)

AD-634 075 **Field 13H, 11F, 13I**
CFSTI Prices: HC$5.00 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
MACHINING AND GRINDING OF NICKEL-AND COBALT-BASE ALLOYS,
by C. T. Olofson, J. A. Gurklis, and F. W. Boulger. 20 Apr 66, 146p
Contract DA-01-021-AMC-11651 (Z)
NASA TM-X-53446, RSIC 482

Descriptors: (*Nickel alloys, Material removal), (*Cobalt alloys, Material removal), (*Material removal, State-of-the-art reviews), Machining, Grinders, Chemical milling, Electroerosive machining, Cutting, Cutting tools, Drilling, Machine shop practice, Machine tools, Milling machines, Reamers, Lathes, Cutting fluids, Drilling machines, Precision finishing, Abrasives, Grinding, Electrolytes, Cleaning, Friction, Heat-resistant metals + alloys, Corrosion-resistant alloys, Mechanical properties, Copper alloys, Iron alloys, Chromium alloys, Casting alloys.

The report covers the state of the art of metal-removal operations for nickel- and cobalt-base alloys. It describes the methods currently employed for conventional machining, grinding, electrolytic, and chemical-machining processes. The precautions that should be taken to avoid troubles resulting from the characteristics typical of these alloys are pointed out. Nine machining, two grinding, two cutting, and two unconventional metal-removal operations are discussed separately. Other sections discuss the classification of these alloys and their general response to machining variables. (Author)

AD-634 076 **Field 13H, 11F, 11C**
CFSTI Prices: HC$4.00 MF$1.00
Battelle Memorial Inst., Columbus, Ohio.
SURFACE TREATMENTS FOR NICKEL AND NICKEL-BASE ALLOYS,
by C. M. Jackson, and A. M. Hall. 20 Apr 66, 140p
Contract DA-01-021-AMC-11651 (Z)
NASA TM-X-53448, RSIC 513

Descriptors: (*Nickel, Finishes + Finishing), (*Nickel alloys, Finishes + Finishing), (*Finishes + Finishing, State-of-the-art reviews), Coatings, Mechanical working, Diffusion coating, Electroplating, Hardening, Vapor plating, Wear resistance, Lubrication, Fatigue (Mechanics), Fracture (Mechanics), Mechanical properties, Surfaces, Surface properties, Welds, Plating, Corrosion inhibition, Erosion, Chromium alloys, Cobalt alloys, Molybdenum alloys, Iron alloys, Industrial equipment, Metal coatings, Aluminum, Oxidation, Heat treatment, Corrosive gases, Chromium, Precision finishing, Hardness, Explosive forming, Silicon alloys, Aluminum alloys, Tantalum alloys, Beryllium, Boron, Carbon, Nitrogen, Zirconium, Zirconium alloys, Flame spraying.

The report presents the state of the art in regard to selected surface treatments for nickel and nickel-base alloys. The treatments covered are diffusion coating, electroplating, electroless plating, hard facing, surface treatment for purposes of lubrication, explosive hardening, peening, burnishing and planishing. Each treatment is described and its application to nickel and nickel-base alloys is discussed. Reasons for using the treatment are covered, as are the effects of the operations involved on appropriate properties of nickel and nickel-base alloys. Problem areas are defined and recommendations for research are made. (Author)

N66-21347 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
Sippican Corp., Marion, Mass.
MAGNET WIRE WELD STUDY.
Final rept.
24 Feb 65, 87p R-356A
Contract NAS7-100
NASA CR-71425
Subcontracted to Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena, Contract JPL-950836.

Descriptors: *Insulation, *Nickel, *Wire, *Magnetic material, *Welding.

N66-21728 **Field 13H**
CFSTI Prices: HC$2.00 MF$0.50
Harris Research Labs., Inc., Washington, D. C.
THE EFFECT OF SURFACE CONTAMINATION ON CONTACT ANGLES AND SURFACE POTENTIALS.
Summary rept.,
by A. H. Ellison, and A. M. Schwartz. 13 Jan 66, 46p
Contract NAS3-7104
NASA CR-54708

Descriptors: *Fuel tank, *Liquid propellant, *Spacecraft, *Surface property.

N66-21784 **Field 13H**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Huntsville, Ala. George C. Marshall Space Flight Center.
WELDING PROGRESS SUMMARY.
1965, 87p NASA-TM-X-57330

Descriptors: *Aluminum alloy, *Flaw, *Porosity, *Welding.

N66-22346 **Field 13H**
CFSTI Prices: HC$1.00 MF$0.50
Solar, San Diego, Calif.
ESTABLISHMENT OF AN OPTIMUM HEAT TREATMENT FOR USE IN 718 ALLOY BELLOWS AND GIMBAL STRUCTURES.
Semiannual rept., 1 Aug 65-28 Feb 66,
by P. J. Valdez. Mar 66, 23p RDR-1460
Contract NAS8-11282
NASA CR-71997, NASA R-ME-IV-S-4

Descriptors: *Fracture mechanics, *Heat treatment, *Inconel, *Metallurgy.

AD-297 528 **See Field 9A**

AD-633 496 **See Field 9A**

AD-633 527 **See Field 11D**

AD-633 567 **See Field 19A**

AD-633 568 **See Field 19A**

AD-633 688 **See Field 9A**

AD-633 734 **See Field 9A**

AD-633 777 **See Field 9A**

AD-633 783 **See Field 9A**

AD-633 897 **See Field 11C**

AD-633 944 **See Field 19C**

AD-633 976 **See Field 9A**

AD-633 992 **See Field 11F**

AD-634 030 **See Field 9A**

AD-634 048 **See Field 9A**

AD-634 049 **See Field 9A**

AD-634 094 **See Field 11F**

PB-170 330 **See Field 5C**

PB-170 331 **See Field 5C**

13I. MACHINERY AND TOOLS

AD-634 112 **Field 13I, 11H**
CFSTI Prices: HC$2.00 MF$0.50
Rock Island Arsenal, Ill.
LUBRICANT ADDITIVE EFFECTS UPON BEARING METAL FATIGUE. I. ROLLING CONTACT ADAPTATION FOR FOUR BALL EP TESTER.
Technical rept.,
by Max T. Fisher. Apr 66, 27p RIA-66-1293
Proj. DA-1C024401A107

Descriptors: (*Lubricant additives, *Antifriction bearings), Fatigue (Mechanics), Metals, Test equipment, Pressure, Molybdenum compounds, Sulfides.

A rolling contact adaptation of the Four Ball Extreme Pressure Tester was devised and evaluated for its utility in determining the effects of additives in oils on the fatigue life of 52100 steel balls. Six compounds, similar in molecular size to common additives but selected for different configurations and functional groups, were combined with low viscosity (80 SUS at 100F.) paraffinic and naphthenic oils in five percent concentrations. Their effects upon fatigue, compared with that of the oils alone, were determined. Molybdenum disulfide was also evaluated in the same manner. Based on fewer tests than statistically desirable, the '10% life' taken from Weibull distribution plots of the results indicate that different additives and lubricant bases have varying effects upon the fatigue life of bearings. It appears that reasonably fast, economical and reliable ball bearing fatigue life results can be expected with this relatively inexpensive rolling contact adaptation of the widely used Four Ball EP Tester. (Author)

AD-442 879 **See Field 9E**

AD-633 664 **See Field 11F**

AD-634 075 See Field 13H

PB-170 287 See Field 5C

13J. MARINE ENGINEERING

AD-633 826 **Field 13J, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
UNDERSEA RESEARCH VEHICLES,
by I. N. Sakhalov. 1966, 4p Translation-2092
TT 66-61424
Podvodnye Issledovatelskie Apparaty, trans. of mono. Sudostroenie (USSR) 1965 p18-9.

Descriptors: (*Submarines, Scientific research), USSR, Deep submergence, Marine biology, Oceanology.

The article describes the fully self-sustaining undersea vehicle TINRO-1 which is intended for conducting a broad complex of scientific research work in the waters of the continental shelf at depths up to 300m. With the help of it, the exploration of fish accumulations can be conducted. It will be possible to study their behavior and reaction to artificial irritants, to observe the performance of the fishing equipment, to measure water and current characteristics, to survey the bottom structure, and to conduct series of other studies. Also described is the TINRO-2 which is designed for a limited duration of self sufficiency and will be transported to the submerging point on board a mother ship. It also has a considerably smaller displacement and size.

AD-633 926 **Field 13J, 11G**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
THERMOCHEMICAL TESTS OF DOMESTIC TURBINE DRIVEN SHIPS,
by A. Goldenfon, and R. Taranenko. 1966, 7p Translation-2175
TT 66-61437
Teplokhimicheskie Isptaniya Otechestvennkh Turbokhodov, trans. of Morskoi Flot (USSR) n7 p26-8 1965.

Descriptors: (*Ship turbines, Performance (Engineering), (*Feed water, Chemical properties), USSR, Standards, Salinity, pH, Evaporators, Steam.

The standards for the quality of feed water and boiler water, which have been accepted by the instructions for servicing of KVG-25 and KVG-34 boilers, which are installed on the LENINSKIY KOMSOMOL and PEKIN class of ships should be changed; these standards should take into consideration the operation of these ships by the Black Sea Agency and the conducted thermal-chemical tests. As a result, the salinity of the feed water should be decreased from 6 to 1 mg/kg Cl' and the boiler water from 0-275 to 0-50 mg/kg, and at most, up to 0-180 mg/kg Cl'; the alkaline number of boiler water should be decreased from 11-100 to 10-50 mg/kg NaOH. Under normal operating conditiions, the drainage of the boiler should constitute 0.2-0.5% instead of the previously established 2%. The salt content in the saturated steam should not exceed 0.1 mg/kg.

AD-633 936 **Field 13J, 5C, 21D**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
LARGE CAPACITY SHIPS IN THE WORLD TANKER FLEET,
by A. Ivanov, and L. Belyakov. 1966, 6p Translation-2118
TT 66-61439
Za Rubezhom Krupnotonnazhnye Suda v Mirovom Tankernom Flote, trans. of Morskoi Flot (USSR) n7 p40-1 1965.

Descriptors: (*Tankers, Design) Commerce, Petroleum, Ports, Costs, USSR, Merchant vessels.

The tendency toward the construction of large tankers in the capitalistic countries testifies to the aggravation of the competitive battle for the charter market. The growth in the size of the tankers is combined with the decrease in the operation expense and curtailment of numerical quantity of crew on account of the automated operation of the ship. In the conditions of the West, this serves the fundamental goal of capitalistic means of production, the receipt of monopolistic profits. (Author)

AD-633 937 **Field 13J, 15E**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
STOWAGE OF CARGO ABOARD A SHIP TO OBTAIN MAXIMUM PROFIT,
by E. Gromovoi,and A. Shvartsman. 1966, 12p Translation-2117
TT 66-61440
Komplektovanie Sudna Gruzami dlya Polucheniya Maksimalnovo Dokhoda, trans. of Morskoi Flot (USSR) n7 p13-5 1965.

Descriptors: (*Cargo, Shipborne), Storage, Costs, USSR, Reliability, Logistics.

AD-633 947 **Field 13J, 11D**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
FISHING MOTORBOAT MADE OF GLASS REINFORCED PLASTIC,
by N. A. Panfilov. 1966, 8p Translation-2096
TT 66-61442
Rybopromyslovyi Motobot iz Stekloplastika, trans. of Sudostroenie (USSR) n6 p78-81 1965.

Descriptors: (*Plastic boats, *Glass textiles), (*Boats, Performance (Engineering)), Fishes, Design, Hulls (Marine), USSR, Marine propulsion, Composite materials, Reinforcing materials.

AD-634 058 **Field 13J, 11I, 11E**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
EXPERIENCE IN USING SECONDARY CAPRON FOR MARINE HARDWARE,
by V. F. Agranat, I. G. Potapov, and P. A. Akamova.1966, 11p Translation-2196
TT 66-61463
Trans. of Sudostroenie (USSR) n8 p43-7 1964.

Descriptors: (*Nylon, *Marine engineering), Fibers (Synthetic), USSR, Processing.

AD-634 110 **Field 13J, 21E**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
THE USE OF SINGLE-SHAFT AVIATION GAS-TURBINE ENGINES IN HYDROFOILS,
by P. A. Bulygin, and G. S. Mineev. 1966, 8p Translation-2136
TT 66-61468
Primenenie Aviatsionnykh Odnovalnykh Gazoturbinnykh Dvigatelei na Dusakh s Podvodnymi Krylyami, trans. of mono. Sudostroenie, 1965 p35-8.

Descriptors: (*Hydrofoil boats, *Gas turbines), Shafts, USSR, Propellers (Marine), Fuel oil.

Single-shaft aviation TVDs (AI-20A and others) can be used successfully in SPKs without fundamental structural changes. Single-shaft aviation TVDs can be used in conjuction with controllable pitch aircraft type propellers, with controllable, or fixed, pitch propellers used for ships, or with a water-jet propeller. When production line single-shaft aviation TVDs are used as main engines the most suitable propeller for river ships is the water-jet propeller, which has a long life and makes the solution to the problem of reviving up the TVD during starting a comparatively simple one. Aviation GTDs run reliably on diesel fuel, as well as on kerosene, and all parameters remain virtually unchanged. The conversion of aviation single-shaft TVDs system for controlling rpm and power output, required when the engines are used with a water-jet propeller or a fixed pitch marine propeller and a hydraulic clutch, is very simple and reduces to taking out the governor and replacing the fuel pump with a fuel pump-governor. (Author)

AD-268 627 See Field 11F

AD-633 638 See Field 14B

AD-633 687 See Field 13L

AD-633 698 See Field 1C

AD-633 832 See Field 15E

AD-633 849 See Field 21D

AD-633 862 See Field 1C

AD-633 880 See Field 13F

AD-633 898 See Field 15E

AD-633 925 See Field 11F

AD-633 938 See Field 11C

AD-633 991 See Field 20A

AD-634 094 See Field 11F

PB-169 054 See Field 17B

13K. PUMPS, FILTERS, PIPES, FITTINGS, TUBING, AND VALVES

AD-633 536 **Field 13K, 14B**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ELECTROMAGNETIC PUMPS FOR ALKALI METALS,
by N. I. Marin, V. A. Tovsten, T. V. Koktorova, and E. M. Avilova. 20 Jan 66, 11p FTD-TT-65-1456
TT 66-61384
Unedited rough draft trans. of Atomnaya Energiya (USSR) v18 n3 p239-42 1965.

Descriptors: (*Electromagnetic pumps, Alkali metals), (*Liquid metal pumps, Electromagnetic pumps), Laboratory equipment, Liquid metals.

Results are given for the development of a series of electromagnetic spiral pumps for laboratory purposes with a productivity of 0.1-150 cu m/hour.

IDO-14666 **Field 13K, 18G**
CFSTI Prices: HC$1.00 MF$0.50
Phillips Petroleum Co., Idaho Falls, Idaho. Atomic Energy Div.
A FLOW DIVERTER-VALVE FOR GRANULAR SOLIDS,
by J. C. Petrie, and E. D. Cooper. Mar 66, 17p
Contract AT (10-1)-205

Descriptors: (*Pneumatic valves, Performance (Engineering)). (*Radioactive waste, Processing).

AD-633 771 See Field 11F

13L. SAFETY ENGINEERING

AD-633 687 **Field 13L, 13J**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
A COMPARATIVE TESTING STUDY OF FIRE EXTINGUISHING AGENTS FOR SHIPBOARD MACHINERY SPACES.
Memo. rept.,
by E. J. Jablonski, H. B. Peterson, and R. L.

Tuve. 15 Apr 66, 22p NRL-MR-1696
Projs. SF-015-07-02-3350, RR-001-01-43-4650

Descriptors: (*Fire extinguishers, Shipborne), Foams, Compatibility, Fire safety, Potassium compound, Powders, Carbonates, Water, Films, Effectiveness.

Fire tests employing a 735 sq ft bilge area covered with No. 2 diesel fuel within a simulated shipboard engine room structure were conducted. These tests were designed primarily to compare the effectiveness of the new 'Light Water-Purple-K-Powder' system and the Type 5 protein foam presently used aboard ship. Other agents, such as 'XL-6' protein foam, and carbon dioxide were tested. The effect of using these agents individually on a bilge fire, and also on a simulated 10 gpm fuel line rupture, spray fire, where a fire fighter was required to gain access inside the area and shut off the fuel valve near the fuel spray, was studied. The twinned use of 'Light Water-PKP as compared to Type 5 protein-PKP on the combined bilge and spray fire was also studied.

AD-633 709 **Field 13L, 21B**
CFSTI Prices: HC$2.00 MF$0.50
Southern Forest Fire Lab., Macon, Ga.
PROJECT FIRE MODEL: AN EXPERIMENTAL STUDY OF MODEL FIRES.
Final rept.,
by G. M. Byram, H. B. Clements, M. E. Bishop, andR. M. Nelson, Jr. 1 Jun 66, 48p
Contract OCD-PS-65-40

Descriptors: (*Fires, Models (Simulations)), (*Combustion, Models (Simulations)), Flames, Burning rate, Wind, Moisture, Statistical analysis, Experimental data, Propagation.

Identifiers: Fire model project.

The main objectives of the experimental work described in the report were (1) to gain more knowledge of the structure of freeburning fires, (2) to obtain a better understanding of the mechanisms of fire spread, and (3) to determine the significance of some of the many independent variables in fire spread. Although it was not possible to predict the behavior of large-scale fires from the crib and pool fires used in this study, the information gained from these tests was essential for work now underway in the development of scaling laws and in determining the characteristics that a model fire should have. The report deals primarily with the physical characteristics such as rate of spread, fuel burning rate, flame length, flame temperature, and flame velocity of crib and pool fires. It also considers the possible effects of wind speed and slope on the residence time and the unit area burning rate--two basic fuel bed parameters. Some results of work now in progress on scaling law development is summarized briefly. (Author)

AD-634 042 **Field 13L**
CFSTI Prices: HC$2.00 MF$0.50
Forest Service, Washington, D. C. Div. of Fire Control.
FIRE BIBLIOGRAPHY: SELECTED URBAN, AND MIXED URBAN - RURAL FIRES, 1940-1964,
by T. G. Storey, and J. H. Dieterich. May 65, 49p
Contract OCD-PS-64-229
Rept. on National Fire Coordination Study.

Descriptors: (*Fires, Bibliographies), Urban areas, Rural areas, Fire safety, Nuclear explosions.

The report provides an 'annotated bibliography' of selected past fires that were considered for study by the staff of Project 229 and includes a brief summary and description of: (1) strictly urban fires and (2) fires in mixed urban-rural areas. Study fires were chosed from this prepared list. Eighty major fires occurring since 1940 are described. Of these 80 fires, 47 are urban fires and 33 are mixed urban-rural fires. The listing of fires in this manner provides a base from which to choose additional fires for possible study, and makes available the results of our search of past fires for people who in the future might review or study large fires. (Author)

PB-168 613 **Field 13L, 15C**
CFSTI Prices: HC$5.00 MF$1.25
Forest Service, Washington, D. C. Div. of Fire Control.
NATIONAL FIRE COORDINATION STUDY.
Phase one rept.,
by William R. Moore, James W. Jay, and John H. Dieterich. May 65, 182p
Contract OCD-PS-64-229

Descriptors: (*Fire safety, Civil defense systems), (*Civil defense systems, Fire safety), Nuclear warfare, Management planning, Urban areas, Rural areas, Cost effectiveness, Training.

The report examines the nuclear fire problem, establishes the basis for a fire defense program, examines potential elements for fire defense, and suggests alternative fire defense programs made up of combinations of these elements. It is a working paper intended to help the Office of Civil Defense plan the fire defense program and to provide a basic reference for those engaged in planning and implementing the approved fire defense program. (Author)

PB-170 366 **See Field 13B**

PB-170 602 **See Field 13B**

13M. STRUCTURAL ENGINEERING

AD-633 800 **Field 13M**
CFSTI Prices: HC$4.00 MF$0.75
Fritz Engineering Lab., Lehigh Univ., Bethlehem, Pa.
THE SUBASSEMBLAGE METHOD OF DESIGNING UNBRACED MULTI-STORY FRAMES,
by J. Hartley Daniels, and Le-Wu Lu. Mar 66, 102p
FEL-273.37
Rept. on Plastic Design of Multi-Story Frames.

Descriptors: (*Structural parts, Design), Buildings, Plasticity, Steel, Beams (Structural).

A new method is presented for the design of columns and girders in unbraced multi-story steel frames which are subjected to combined horizontal wind loads and distributed gravity loads. The method is based on the concept of sway subassemblages and considers the elasticplastic behavior of girders, the instability of the beam-columns, and second order effects (caused by P-delta moment) on the structure. It employs a semi-graphical solution using specially prepared charts to develop the complete horizontal load-deflection relationship for each story designed. A design procedure is proposed, and an illustrative example is included to demonstrate the technique developed. (Author)

AD-459 461 **See Field 6R**

AD-474 778 **See Field 20A**

AD-474 779 **See Field 20A**

AD-475 662 **See Field 20A**

AD-633 511 **See Field 13B**

AD-633 740 **See Field 8M**

AD-633 916 **See Field 13A**

14A. COST EFFECTIVENESS

AD-447 329 **See Field 9B**

AD-633 878 **See Field 9B**

AD-634 087 **See Field 12B**

14B. LABORATORIES, TEST FACILITIES, AND TEST EQUIPMENT

AD-423 017 **Field 14B, 20F**
CFSTI Prices: HC$5.60 MF$0.75
Barnes Engineering Co., Stamford, Conn.
FREE AIR THERMOMETER DEVELOPMENT MODEL. MODEL 14-201, SERIAL 101.
Final technical summary rept.,
by R. J. Kanzler. 27 Sep 63, 52p BEC-4277-A
Contract DA-36-039-sc-90771

Descriptors: (*Infrared optical systems, Radiometers), (*Thermometers, Radiometers), Air, Aircraft, Infrared radiation, Carbon dioxide, Emissivity, Blackbody radiation, Temperature, Thermostats, Measurement, Targets, Filters (Electromagnetic wave), Bandwidth, Absorption, Sensitivity.

A radiometric thermometer has been designed and fabricated for routine measurement of long path lengths of air from a moving aircraft. It measures the radiation emitted from atmospheric C02 in a narrow wavelength region centered on the C02 band at 15 microns, and compares this radiation with the emission from a reference blackbody. Their difference is then related empirically to air temperature. The instrument's operation is unaffected by ambient thermal conditions because of a novel arrangement of thermostated optical components. As a result, absolute measurement of air temperature is made to 0.5C over a target temperature range of -60 to + 30 C. (Author)

AD-453 130 **Field 14B**
CFSTI Price: HC$2.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A LOW-LOAD THREE-COMPONENT FORCE BALANCE FOR MEASUREMENTS IN A LOW-DENSITY WIND TUNNEL.
Technical documentary rept.,
by George D. Arney Jr., and Wade T. Harter.
Dec 64, 25p
Contract AF 40 (600)-1000,
Proj. ARO-VL2517
Task895004
AEDC TDR-64-280, N65 14997
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Balances, Wind tunnels), (*Wind tunnels, Balances), Measurement, Loading (Mechanics), Lift, Drag, Pitch (Motion), Calibration.

The paper describes a three-component force balance which was developed for measurement of lift, drag, and pitching moment acting on models in a low-density, hypervelocity wind tunnel. Although designed for a particular wind tunnel, the general arrangement and the principles involved should be applicable to similar situations. The balance is of the external type operating on the nulling principle. Nulling of each component is accomplished automatically through the use of closed loop control systems. Calibration data and sample wind tunnel measurements are presented which demonstrate that the balance is suitable for the intended application. (Author)

AD-633 471 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
EXPERIMENTAL INVESTIGATION OF STAGED PUMPING TECHNIQUES FOR THE REMOVAL OF ROCKET EXHAUST GASES FROM SPACE SIMULATION CHAMBERS,
by W. G. Kirby, and B. A. McCullough. Jun 66,

50p AEDC-TR-66-51
Contract AF 49 (600)-1200,
Projs. AF-6950, ARO-SW2302,
Task 695001
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Space simulation chambers, Degasification), (*Cryopumping, Space simulation chambers), Hydrogen, Titanium, Exhaust gases, Rocket motors, Gas pumps, Vacuum pumps.

Results of an experimental investigation conducted to determine the feasibility of using titanium gettering to remove large flows of H2 gas and of combining gettering and cryopumping in a staged pumping system to remove simulated rocket exhaust gases are presented. The staged pumping system (about 8 in. in diameter and less than 30 in. long) consisted of a 77K cryopumping stage, a 20K cryopumping stage, and a titanium gettering stage with 77K surfaces. High temperature combustion exhaust gas mixtures, with flow rates up to about 0.3 gm/sec, were pumped, and a pressure level of about 0.001 torr was maintained. (Author)

AD-633 577 **Field 14B**
CFSTI Prices: HC$2.00 MF$0.50
Frankford Arsenal, Philadelphia, Pa. Quality Assurance Directorate.
PHILOSOPHY OF ENVIRONMENTAL TESTING.
Memo rept. (Final),
by David Askin. Apr 66, 36p
Proj. DA-1V025001A622
FA M66-21-1

Descriptors: (*Environmental tests, State-of-the-art reviews), Meteorological parameters, Climatology, Controlled atmospheres, Test methods, Test equipment, Military requirements.

This report discusses the philosophy of environmental testing, gives definitions of the more commonly used terms, classifies the various types of environmental tests, describes some effects of environmental stresses on military equipment and briefly discusses the derivation of environmental criteria and test standards. (Author)

AD-633 622 **Field 14B, 22A**
CFSTI Prices: HC$1.00 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AN INTENSITY AND UNIFORMITY MONITOR FOR SOLAR SIMULATORS,
by B. A. McCullough, B. E. Wood, B. E. Dawson, andR. C. Birkebak. Jun 66, 27p AEDC-TR-66-81
Contract AF 40 (600)-1200,
Proj. AF-8951,
Task 895104
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn., and Georgia Inst. of Tech., Atlanta.

Descriptors: (*Solar radiation, *Monitors), (*Space simulation chambers, Solar radiation), Distribution, Intensity, Thermocouples, Coatings, Reflectometers.

An experimental study of a portable intensity and uniformity monitor for solar simulators is presented. The monitor is a modified integrating sphere coated with MgO and utilizes a thermopile as the detector. The radiation wavelengths used in evaluating the monitor were generated by a carbon arc solar simulator. These data were obtained as a function of time, intensity, temperature, and uniformity. The theory and operation of the monitor employed in these experiments are discussed. A modification of this monitor for use as a reflectometer is also presented. (Author)

AD-633 638 **Field 14B, 13J**
CFSTI Prices: HC$1.10 MF$0.50
Department of the Navy, Washington, D. C.
UNDERSEA LABORATORIES.
1966, 6p Translation-2093
TT 66-61393
Podvodnye Laboratorii, trans. of mono. Sudostroenie (USSR) 1965 p19-20.

Descriptors: (*Laboratories, Underwater), USSR, Naval research, Submarine hulls.

AD-633 656 **Field 14B, 20D**
CFSTI Prices: HC$3.00 MF$0.75
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
A THEORETICAL REAL-GAS ANALYSIS OF THE EXPANSION TUNNEL,
by Glenn D. Norfleet, and F. C. Loper. Jun 66, 81p AEDC-TR-66-71
Contract AF 40 (600)-1200,
Proj. AF-7778
Prepared in cooperation with ARO, Inc., Tullahoma, Tenn.

Descriptors: (*Test facilities, Aerodynamics), Analysis, Shock tubes, Theory, Performance (Engineering), Shock waves.

Identifiers: Expansion tubes.

A theoretical real-gas analysis of the expansion tunnel is presented. A digital computer program, developed for this investigation, is discussed and Fortran listings and flow charts are included. Tunnel performance, test gas slug length, and 'working' parameters are given for several expansion area ratios. Driver temperature and energy requirements are given for specific cases. (Author)

AD-633 695 **Field 14B, 15C, 9E**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
TRANSISTORIZED DIGITAL CLOCK WITH SERIAL BINARY-CODED READOUT.
Interim rept.,
by L. O. Hayden. 10 May 66, 20p NRL-6389
Proj. RT-8801-001/6521/S434-00-01

Descriptors: (*Clocks, Digital systems), Transistors, Timing circuits, Binary arithmetic, Time signals, Space surveillance systems, Naval research.

A transistorized digital clock and coder unit has been developed which is being used as part of the time standard equipment at the U. S. Naval Space Surveillance Stations in Hawkinsville, Georgia, Red River, Arkansas, and Raymondville, Texas, which were instrumented in 1965. This unit is powered by a 24-v battery supply and is capable of 24 hours of emergency service in case of commercial power failure. Decimal digits are read out in binary format at a rate of one decimal digit per second. Each group of pulses comprising a decimal digit is clearly separated from the next pulse group. Once the code is learned, it is much easier to recognize than the one formerly used in the Space Surveillance system. The transistorized circuitry used in this unit has resulted in a considerable reduction in size and power input (12 w) as compared with the vacuum tube unit which has been used for a similar purpose in other Space Surveillance stations. Also, the error in coding due to aging of components has been eliminated since only two levels must be distinguished in the binary logic as compared with the ten voltage levels of the decimal logic in the earlier equipment. The new unit employs two cascaded gates, one switching at 0.1-sec intervals and the other at 1.0-sec intervals. (Author)

ANL-6894 **Field 14B, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Argonne National Lab., Ill.
STUDIES OF STOICHIOMETRIC AND HYPERSTOICHIOMETRIC SOLID SOLUTIONS IN THE THORIA-URANIA SYSTEM,
by E. D. Lynch. Dec 65, 40p
Contract W-31-109-eng-38

Descriptors: (*Solid solutions, Stochastic processes), (*Environmental tests, Solid solutions).

NBS-TN-288 **Field 14B**
CFSTI Prices: HC$0.30 MF$0.50
National Bureau of Standards, Washington, D. C. Metrology Div
MEASUREMENT PHILOSOPHY OF THE PILOT PROGRAM FOR MASS CALIBRATION,
by P. E. Pontius. 6 May 66, 44p
Available from Superintendent of Documents, GPO, Washington, D. C., 20402, $0.30.

Descriptors: (*Standards, Calibration), (*Calibration, Standards), Weight, Density, Test methods, Measurement, Probability, Performance (Engineering).

Identifiers: Mass.

The Pilot Program for mass measurement is the result of a consideration in which the values produced are thought of as the products of a mass measurement process. The collective performance of elements of the mass measurement process results in establishing the process precision which, under certain conditions, can be described quantitatively by pertinent performance parameters. The uncertainty attached to the product of the process, the measured value, is computed from these parameters and reflects the total performance of the process rather than the immediate measurement which might have produced the value. Interpretations of uncertainty and surveillance tests are discussed. The Pilot Program in mass measurement, whereby suitable process performance parameters can be established for precise mass measurement processes in other facilities, is discussed. (Author)

N66-21356 **Field 14B**
CFSTI Prices: HC$4.00 MF$1.00
Princeton Univ., N. J. Dept. of the Aerospace and Mechanical Sciences.
TRANSIENT PRESSURE MEASURING METHODS RESEARCH.
Technical summary rept., 1 Jan-30 Jun 65,
by J. P. Thomas. 16 Nov 65, 138p Aero-Eng-595P
Contracts NASR-36, NAS8-11216
NASA CR-71401

Descriptors: *Dynamic pressure, *Pressure transducer, *Pressure measurement, *Rocket chamber, *Transient pressure.

N66-21561 **Field 14B**
CFSTI Prices: HC$6.00 MF$1.50
Franklin Inst. Research Labs., Philadelphia, Pa.
COMPUTER CONTROL STUDY FOR A MANNED CENTRIFUGE.
Final technical rept.,
by E. Pack, K. -C. Tsui, and J. Stone. Jun 65, 254p F-B2300-1
Contract NAS9-3570
NASA CR-65298

Descriptors: *Centrifuge, *Acceleration stress, *Analog simulation, *Control system.

N66-22174 **Field 14B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration. Moffett Field, Calif. Ames Research Center.
PERFORMANCE OF A COMBUSTION DRIVEN SHOCK TUNNEL WITH APPLICATION TO THE TAILORED-INTERFACE OPERATING CONDITIONS,
by R. S. Hiers, D. A. Stewart, and W. J. Loubsky. 1964, 14p NASA-TM-X-54960
Prepared for presentation at the Conference on Performance of High Temperature Systems (3rd), Pasadena, Calif., Dec 1964.

Descriptors: *Combustion wind tunnel, *Performance characteristics, *Shock tunnel.

N66-22226 Field 14B
CFSTI Prices: HC$3.00 MF$0.75
Grumman Aircraft Engineering Corp., Bethpage, N. Y.
MAN-SYSTEM LOCOMOTION AND DISPLAY CRITERIA FOR EXTRA-TERRESTRIAL VEHICLES.
Dec 65, 67p
Contract NAS8-20015
NASA CR-71757

Descriptors: *Human performance, *Lunar surface vehicle, *Simulator, *Visual task.

N66-22257 Field 14B
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DESCRIPTION AND RESEARCH CAPABILITIES OF THE LANGLEY LOW-FREQUENCY NOISE FACILITY,
by P. M. Edge Jr., and W. H. Mayes. 1965, 16p
NASA-TM-X-56563
Prepared for presentation at the Meeting of the Acoustics Society of America (69th), Washington, 2-5 Jun 1965.

Descriptors: *Low frequency, *Sonic boom, *Environmental testing, *Noise, *Research facility.

N66-22354 Field 14B
CFSTI Prices: HC$6.00 MF$1.50
Northrop Space Labs., Hawthorne, Calif.
FOLLOW-ON STUDIES AND INVESTIGATION RELATED TO THE CHEMICAL HAZARDS POTENTIAL STUDY.
Final rept.,
by M. S. Christensen. Mar 66, 269p NSL-65-136-1
Contract NAS9-4795
NASA CR-65321

Descriptors: *Hydrogen, *Liquid oxygen (Lox), *Safety hazard, *Cryogenic propellant, *Propellant tank.

N66-22367 Field 14B
CFSTI Prices: HC$1.00 MF$0.50
Aero Vac Corp., Troy, N. Y.
INVESTIGATION OF VACUUM PUMPING ON BEDS OF SOLID MATERIALS.
Final rept.
16 Feb 66, 20p
Contract NAS1-5434
NASA CR-66079

Descriptors: *Time factor, *Vacuum chamber, *Lunar soil, *Pumping.

PB-169 593 Field 14B
CFSTI Price: HC$6.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
WIND TUNNEL INVESTIGATIONS OF TRANSONIC TEST SECTIONS. PHASE I. TESTS OF A 22.5-PERCENT OPEN-AREA PERFORATED-WALL TEST SECTION IN CONJUNCTION WITH A SONIC NOZZLE.
Technical rept.,
by William L. Chew. Oct 53, 67p AEDC-TR-53-10
AD 26928
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Transonic wind tunnels, Tests), Performance (Engineering), Transonic nozzles, Supersonic flow, Boundary layer, Diffusers, Model tests.

The major portion of the results presented are for walls with 1/4-in. diameter perforations in a 1/16-in. plate. Comparisons are made with results from tests with 1/16-in. diameter perforations. Variations in wall angle, diffuser flap position, tunnel pressure ratio, hole size, and initial expansion region were made to determine the effect on tunnel performance with and without auxiliary suction for a Mach number range of 0.8 to 1.2. Taper strips improved the Mach number distributions considerably both in the supersonic and subsonic speed range. With parallel walls and empty test section, a maximum Mach number of 1.125 was obtained with diffuser suction and a maximum tunnel pressure ratio of 1.4. Mach number 1.0 was attained with a tunnel pressure ratio of 1.25. With parallel walls and diffuser flaps closed, the minimum auxiliary suction requirement to attain Mach number 1.0 was 2.2 percent of the main flow. A 5 percent blockage body increased the auxiliary suction to 3.65 percent. The optimum operating condition for the tunnel at any wall angle is with auxiliary suction and the diffuser flaps completely closed. (Author)

AD-286 675 See Field 1A

AD-443 562 See Field 1A

AD-460 154 See Field 1A

AD-633 472 See Field 11B

AD-633 536 See Field 13K

AD-633 584 See Field 4B

AD-633 623 See Field 19A

AD-633 643 See Field 13H

AD-633 697 See Field 13H

AD-633 703 See Field 20E

AD-633 714 See Field 11H

AD-633 772 See Field 20K

AD-633 826 See Field 13J

AD-633 873 See Field 13H

AD-633 887 See Field 8M

AD-633 918 See Field 4B

AD-633 920 See Field 4B

AD-634 008 See Field 7D

AD-634 027 See Field 6R

AD-634 043 See Field 8M

PB-169 661 See Field 20G

PB-170 333 See Field 5C

PB-170 367 See Field 11B

14C. RECORDING DEVICES

AD-633 838 Field 14C
CFSTI Prices: HC$1.00 MF$0.50
GM Defense Research Labs., Santa Barbara, Calif. Sea Operations Dept.
PORTABLE FIELD RECORDING SYSTEM.
Technical rept.
May 66, 21p TR66-18
Contract Nonr-4298 (00)
Supported in part by ARPA.

Descriptors: (*Magnetic recording systems, Portable), Extremely low frequency, Timing devices, Magnetic tape, Multiple operation, Bandwidth.

The Portable Field Recording System is a multichannel device that will record, unattended, for 24 hours in a frequency band from dc to 313 Hz. The system can operate without preempting a patch-panel terminal, because female connectors are pigtailed in parallel with each signal input cable jack. Prime power for the system can be furnished by either a 12-vdc source or a 115-vac, 60-cycle source. (Author)

PB-170 602 See Field 13B

14D. RELIABILITY

N66-22370 Field 14D
CFSTI Prices: HC$4.00 MF$0.75
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
LUNAR TV. QUALITY PROGRAM PLAN.
14 Jun 65, 120p
Contract NAS9-3548
NASA CR-65316

Descriptors: *Quality control, *Television camera.

N66-22371 Field 14D
CFSTI Prices: HC$2.00 MF$0.50
Westinghouse Electric Corp., Baltimore, Md. Aerospace Div.
LUNAR TV. RELIABILITY EVALUATION PLAN,
by G. W. Kraeger. 15 Apr 65, 43p
Contract NAS9-3548
NASA CR-65315

Descriptors: *Reliability, *Television camera.

AD-633 724 See Field 9A

14E. REPROGRAPHY

AD-467 466 Field 14E
CFSTI Prices: HC$2.00 MF$0.50
Perkin-Elmer Corp., Costa Mesa, Calif.
HIGH ENERGY PHOTOGRAPHIC PRINTING LIGHT SOURCE.
Final technical rept. Feb 64-Jun 65,
by Morris F. Brillhart. 28 Jul 65, 40p
Contract AF 33 (615)-1133
AFAL TR-65-145, N65 31196

Descriptors: (*Photographic lighting systems, Design), Photographic printers, Resolution, Sensitivity, Lasers, Plasma medium, Illumination, Optical equipment, Lenses, Water, Cooling, Safety devices.

An applied research program has been performed to produce a high energy photographic printing light source for exposure of high-resolution low-sensitivity non-silver-halide materials in a high-speed printer, that will produce 200 lines/mm to third generation. Two categories of light source were investigated, lasers and the plasma arc. The plasma arc was selected as the one light source presently available meeting the requirements for spectral emission, continuity of energy, and illumination output. An experimental apparatus has been constructed utilizing an optical system of reflectors and lenses. This optical system shapes the light from the light source to produce uniform illumination over the 10-inch dimension of the 1 x 10 in. aperture which is placed on the film plane. (Author)

AD-633 940 Field 14E, 8G
CFSTI Prices: HC$1.00 MF$0.50
Institute of Modern Languages, Inc., Washington, D. C.
DIRT ROADS AS AN INDICATOR IN THE AERIAL PHOTO INTERPRETATION OF SOILS AND TERRAINS,
by E. J. Alexeenko. Jun 66, 9p
Contract DA-44-009-AMC-1563 (T),
Proj. DA-4A021-101A854
AERDL T-1847-66, TT 66-61441
Gruntove Dorogi Indicator Deshifrirova iya Pochvo-Gruntov, trans. of mono. Akademiya Nauk SSSR, Kompleksnoe Deshifrirovanie Aerosnimkov, Moscow, 1964 p90-4.

Descriptors: (*Roads, *Photointerpretation keys), (*Photogeology, *Aerial photography).

Aerial photographs, Terrain, Soils, Photointerpretation, USSR.

N66-21646 Field 14E
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DIGITAL VIDEO-DATA HANDLING,
by R. Nathan. 5 Jan 66, 30p JPL-TR-32-877
Contract NAS7-100
NASA CR-71399

Descriptors: *Television transmission, *Digital spacecraft television, *Video equipment.

AD-633 891 See Field 11I

15B. CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL WARFARE

AD-466 459 Field 15B
CFSTI Prices: HC$2.60 MF$0.50
Chemical Research and Development Labs., Edgewood Arsenal, Md.
ADSORPTION THEORY FOR REMOVAL OF TOXIC AGENTS IN A FLOW PROCESS.
Technical memo,
by William V. Loebenstein. May 65, 23p CRDL-TM-3-12
Task 1C622401A09501

Descriptors: (*Air, Gas filters), (*Chemical warfare agents, Adsorption), (*Adsorption, Gas filters), Gas flow, Theory, Charcoal, Removal.

An adsorption theory was derived which was shown to apply satisfactorily to dissolved materials adsorbed from sugar solutions upon passing through columns of bone char (W. V. Loebenstein Proc of 5th Tech. Session on Bone Char-NBS 253-275 (1957). The theory allows for the complete characterization of the adsorbate-adsorbent system in terms of two fundamental quantities or parameters. The theory interrelates time, flow velocity, amount of adsorbent, initial and final concentrations of adsorbate in a single equation. It enables one to scale up or down for different bed sizes, flow velocities, concentrations, etc., from one set of conditions to another. There are instances where the characteristic parameters fail to remain constant. These anomalies are traceable to one of two causes: either diffusional effects become appreciable to such an extent that the adsorption process is no longer rate-controlling or the assumed irreversible Langmuir-like mechanism becomes a poor approximation. These effects, due to the inability of the over-simplified adsorption model to account completely for the observed results, must be distinguished from real changes observed and predicted by this theory. The effect of humidity falls in this latter category. The adsorbate-adsorbent system is changed as a result of the introduction of a new component-water.

AD-633 641 Field 15B
CFSTI Prices: HC$4.60 MF$0.50
Chemical and Radiological Labs., Army Chemical Center, Md.
EVALUATION OF MILITARY INDIVIDUAL AND COLLECTIVE PROTECTION DEVICES AND CLOTHING,
by John R. Hendrickson. Jul 52, 46p
Proj. 6.3-1
AEC WT-401
Previously catalogued as PB-163 428, released October 5, 1963.

Descriptors: (*Decontamination, Radioactive fallout), (*Protective clothing, Explosion effects), (*Nuclear explosions, Protective clothing), (*Protective masks, Nuclear explosions), Surface burst, Underground explosions, Radioprotective agents, Impregnation, Effectiveness, Ointments.

Identifiers: Evaluation.

Under conditions resulting from surface and underground detonations of atomic bombs, tests were conducted on Chemical Corps impregnated and unimpregnated protective clothing. Individual Protective Mask M9A1 with M11 Canister, Tank Collective Protector E26 and E22, and Protective Ointment M5. Both impregnated and unimpregnated clothing were capable of preventing contact between the skin and radioactive dusts. Unimpregnated clothing demonstrated better contamination-decontamination characteristics, but the secondary radiation from all clothing was negligible. The protective cover was effective in preventing contamination of clothing. The M9A1 mask with M11 canister furnished complete protection against inhalation of radioactive dust. The filtering efficiencies of the E26 tank collective protectors were found to be very high, and no deficiencies were found in the unit. The filtering efficiencies of the E22 tank collective protectors were also high. Panels coated with M5 ointment were found to be much more highly contaminated than bare panels. (Author)

AD-634 099 Field 15B, 6F, 6M, 6E K
CFSTI Prices: HC$5.00 MF$1.00
Aerospace Technology Div., Library of Congress, Washington, D. C.
CBE FACTORS: MONTHLY SURVEY NO. 5.
ATD work assignment no. 50.
1966, 162p ATD-66-50
TT 66-61466
Based on Communist World open sources. See also AD-632 780.

Descriptors: (*Chemical warfare agents, Reviews), (*Biological warfare agents, Reviews), (*Environment, Reviews), Pesticides, Herbicides, Fertilizers, Hallucinogens, Ecology, Aerosols, Micrometeorology, Soils, USSR, Abstracts.

The survey covers the following areas: (I) Chemical factors (pesticides, herbicides, fertilizers, psychotomimetrics, other chemicals); (II) Biological factors (pathogens); (III) Environmental factors (aerosols, ecology, micrometeorology, soil science). (Author)

AD-633 752 See Field 18D

PB-169 000 See Field 6L

15C. DEFENSE

AD-633 695 See Field 14B

AD-633 701 See Field 17I

AD-634 086 See Field 9B

PB-168 613 See Field 13L

15D. INTELLIGENCE

AD-633 491 See Field 5K

15E. LOGISTICS

AD-633 493 Field 15E
George Washington Univ., Washington, D. C. Logistics Research Project.
THE POLARIS MILITARY ESSENTIALITY SYSTEM,
by M. Denicoff, J. Fennell, S. E. Haber, W. H. Marlow, and F. W. Segel. 1964, 26p

Descriptors: (*Inventory control, Decision making), (*Spare parts, Stock level control), Guided missiles (Underwater-to-surface), Shipborne, Logistics.

Identifiers: Polaris.

One of the major requirements for military systems has been the need for a measure of the relative importance of stocking one item rather than another. The study develops one such system which has been implemented for the Polaris weapons system. Considerable emphasis is placed on systematic development of underlying principles. It is concluded that the present approach could readily be adapted to other weapons systems. (Author)

AD-633 832 Field 15E, 13J
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
THE OVERALL DEVELOPMENT OF THE MERCHANT MARINE AND ITS ROLE IN THE UNIFIED TRANSPORT NETWORK OF THE USSR,
by S. Baev. 1966, 23p Translation-1030
TT 66-61427
Kompleksnoe Razvitie Morskogo Flota i ego Rolv Edinoi Transportnoi Seti SSSR, trans. of Morskoi Flot (USSR) n1 p35-40 1964.

Descriptors: (*Shipping (Marine), USSR), Transportation, Economics, Cargo, Commerce, Cargo ships, Merchant vessels, Management engineering.

AD-633 898 Field 15E, 5A, 13J
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
MARITIME TRANSPORTATION PLANNING,
by L. Turetskii. 1966, 14p Translation-1031
TT 66-61434
Planirivanie Perevozok na Morskom Transporte, trans. of Morskoi Flot (USSR) n9 p36-40 1964.

Descriptors: (*Shipping (Marine), *Management planning), USSR.

AD-633 914 Field 15E, 12B
CFSTI Prices: HC$2.00 MF$0.50
Decision Studies Group, Palo Alto, Calif.
OPTIMAL POLICIES FOR STOCKING AND ISSUING INVENTORY WHEN SEVERAL DEMAND CLASSES EXIST,
Technical rept.,
by Donald M. Topkis. 30 Apr 66, 43p
Contract Nonr-4457 (00),
Proj. NR-347-001

Descriptors: (*Optimization, *Stock level control), (*Inventory analysis, Optimization), Inventory control, Decision making.

This report considers the problem of stocking and issuing an item that has two different uses, one being more important than the other. Under certain mild assumptions, if resupply is periodic and the demands are random then the optical issuing policy turns out to be of the single critical number type. At the end of each of K intervals between resupply points all of the more important demand occuring within the interval should be immediately satisfied. Subsequently the less important demand should be satisfied only to the point that the stock level does not drop below a certain critical level. The critical level depends on the time remaining before resupply. Optimal stocking policies issuing procedures are derived for the single period, arbitrary finite period, and infinite period cases in which demand either can or cannot be backlogged if it is not immediately satisfied. (Author)

AD-633 878 See Field 9B

AD-633 937 See Field 13J

AD-633 966 See Field 13F

AD-634 115 See Field 13F

15F. NUCLEAR WARFARE

ABCC-64-65 See Field 6R

AD-633 639 See Field 6R

15G. OPERATIONS, STRATEGY, AND TACTICS

AD-477 579 **Field 15G, 9B**
CFSTI Prices: HC$1.60 MF$0.50
Research Analysis Corp., McLean, Va.
CONCEPT PAPER: COMPUTER-ASSISTED WAR GAMES,
by Robert G. Hendrickson. Nov 65, 20p RAC-TP-192
Contract DA-44-188-ARO-1

Descriptors: (*War games, Data processing systems), (*Data processing systems, War games), Display systems, Computers, Game theory.

This paper explores in general terms the organization and characteristics of war games and develops the use of the application of display terminals and information processing equipment to war-game activities. The author identifies particular display requirements and analyzes the data flow between components of the game in order to establish at what nodal points display equipment can be of significant value in terms of increased response and report generation. A minimum equipment configuration is described that should provide war-gaming activities with a solid capability for increased and improved research output. The software requirements to support the computer-assisted war game, with particular emphasis upon the display aspect, is developed in general terms. (Author)

AD-633 520 **Field 15G**
CFSTI Prices: HC$2.00 MF$0.50
Special Operations Research Office, American Univ., Washington, D. C.
ANNOTATED BIBLIOGRAPHY OF SORO PUBLICATIONS.
Feb 66, 30p
Contract DA-49-092-ARO-7

Descriptors: (*Counterinsurgency, Bibliographies), (*Armed forces operations, Bibliographies), Psychological warfare, Unconventional warfare, Political science, Social sciences, Government (Foreign), Documentation, Technical information centers.

An annotated listing is presented of all SORO publications through December 1965, divided into three main sections: Social Science Research, Foreign Area Studies, and Rapid Response Information and Analysis. The bibliography is indexed by author and by country or area. (Author)

AD-258 634 **See Field 16C**

AD-633 912 **See Field 12B**

16A. MISSILE LAUNCHING AND GROUND SUPPORT

AD-633 660 **Field 16A, 19G**
CFSTI Prices: HC$3.00 MF$0.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
LAUNCHING OF GUIDED ROCKETS,
by M. V. Patrikeitsev. 19 Jan 66, 90p FTD-MT-64-528
TT 66-61399
Edited machine trans. of mono. Pusk Upravlyaemykh Raket, Moscow, 1963 83p.

Descriptors: (*Guided missiles, *Launching), USSR, Ground support equipment, Guided missile launchers, Checkout equipment, Checkout procedures, Rockets.

In the pamphlet the arrangement and action of ground equipment of rocket complex, different auxiliary equipment ensuring launching of rockets, and the role and problem of systems of flight control are explained. The pamphlet tells about preparation of rockets for launching and its accomplishment from ground, naval, and aircraft launchers. All the actual and numerical material placed in the pamphlet is taken from open Soviet and foreign press, and questions of prospects of development of ground equipment are presented with respect to the views of foreign military specialists. The pamphlet is designed for soldiers, sergeants, students of military schools, and also for a wide circle of readers interested in rocket technology. (Author)

AD-633 998 **Field 16A**
CFSTI Prices: HC$1.10 MF$0.50
RAND Corp., Santa Monica, Calif.
MISSILE SAFETY -- THE UNSUNG EFFORT BEHIND THE SPACE PROGRAM,
by Harriett E. Porch. Oct 62, 7p P-2630

Descriptors: (*Guided missile safety, Hazards), Reviews, Fuels, Launching, Guided missile personnel, Maintenance personnel.

16B. MISSILE TRAJECTORIES

AD-467 829 **See Field 1A**

AD-633 693 **See Field 4B**

AD-633 779 **See Field 4B**

AD-633 797 **See Field 4B**

AD-633 798 **See Field 4B**

AD-633 799 **See Field 4B**

AD-633 889 **See Field 4B**

AD-634 065 **See Field 4B**

AD-634 066 **See Field 4B**

AD-634 067 **See Field 4B**

16C. MISSILE WARHEADS AND FUSES

AD-258 634 **Field 16C, 15G**
CFSTI Price: HC$14.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
SURFACE-TO-AIR GUIDED MISSILE SYSTEMS. METHODS OF TACTICAL ANALYSIS,
by M. C. Waddell. Mar 61, 148p TG-396
Contract NOrd-7386

Descriptors: (*Guided missiles (Surface-to-air), Tactical weapons), (*Antiaircraft defense systems, Effectiveness), Interception probabilities, Guided missile warheads.

A tactical analysis is presented of surface-to-air missile systems. The purpose of this analysis is to provide a suitable quantitative measure of the effectiveness of a guided missile system in defending surface targets. Two problems arise at the outset, (1) the choice of a proper measure of effectiveness, and (2) the choice of a proper method of analysis i.e., means for getting from the characteristics of the air battle elements to the measure. The choice of a measure of effectiveness is considered in some detail. It must depend upon kill probability, firepower, and coordination of fire. By kill probability is meant the probability that, once undertaken, an engagement of a target will result in damage to that target. By firepower is meant the number of target engagements the defense is capable of during the attack. By coordination of fire is meant the degree to which overkilling of targets, with consequent waste of missiles and firing time, is avoided. Each of these three is treated at length, and the characteristics of a surface-to-air guided missile system are described. (Author)

16D. MISSILES

AD-633 948 **Field 16D, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Science Engineering Associates, Inc., San Marino, Calif.
HYDRA 5 MODEL TESTS RESPONSE DUE TO WAVE ACTION.
Final rept., 6 Jan-6 Mar 66,
by Donald H. Garbaccio. Mar 66, 20p
Contract NBy-62199
NCEL CR-66-004

Descriptors: (*Guided missiles (Surface-to-Surface), *Hydrodynamics), Model tests, Model basins, Fluid mechanics, Water waves.

Identifiers: Hydra program.

Details are reported on the design for 1/20 linear scale model of an approximately 15,000 pound 40 foot long missile (Hydra) now operated by the Naval Missile Center, Pt. Mugu, from a vertically floating position on the open ocean as a scientific space probe. Natural periods of model oscillation of 1.9 seconds in heave and 3.0 seconds in pitch are predicted. The model was built and proof tested. It is desired to improve missile stability in a seaway. Hence, there is included a program for the measurement in the wave tank (100 x 2 x 3 feet high) of the response of the model freely floating in water 2.5 ft deep to regular waves of varying height up to 5.0 inches with period and length of respectively 0.90 seconds and 4.1 feet to 4.5 seconds and 38.8 feet. These measurements, besides steering missile modification where required, should assist in the prediction of missile response to seas up to state 4. (Author)

AD-450 558 **See Field 1A**

AD-633 957 **See Field 10C**

17. NAVIGATION, COMMUNICATIONS, DETECTION, AND COUNTERMEASURES

N66-21435 **Field 16E**
CFSTI Prices: HC$2.00 MF$0.50
Radio Corp. of America, Princeton, N. J. Microwave and Power Devices Operations Dept.
DESIGN AND FABRICATION OF A LASER MODULATOR.
Final rept., 27 Jul-27 Oct 65,
11 Nov 65, 28p
Contract NAS5-9620
NASA CR-71516

Descriptors: *Crystal growth, *Electron optics, *Gallium arsenide, *Laser, *Modulator.

17J. SEISMIC DETECTION

AD-633 742 **Field 16O, 7C**
CFSTI Prices: HC$1.00 MF$0.50
Peninsular ChemResearch, Inc., Gainesville, Fla.
PREPARATION OF POTENTIAL ANTIMALARIAL COMPOUNDS.
Final rept. 1 Jul-15 Nov 65,
by Dale A. Warner. May 66, 21p
Contract DA-49-193-MD-2776

Descriptors: (*Antimalarials, Synthesis (Chemistry)), (*Organic nitrogen compounds, Antimalarials), Oximes, Chlorine compounds, Acetones, N-heterocyclic compounds, Pyrroles, Amines, Quinolines, Preparation.

Identifiers: Bis (chloro quinolylamino propyl) piperazines, Bis (oximino propyl) piperazines, Bis (pyrrolidino methyl) hydroxyacetanilides, Bis (pyrrolidino methyl) hydroxyanilines, Chloroacetone oximes.

Satisfactory procedures were developed and samples were prepared of the following compounds: chloroacetone oxime, 1,4-bis (2-oximinopropyl)pi-

perazine, 1,4-bis (2 (7-chloro-4-quinolyamino)propyl) pipcrazine, 3,5-bis (1-pyrrolidinomethyl)-4-hydroxyacetanilide, and 3,5-bis (1-pyrrolidinomethyl)-4-hydroxyaniline hydrochloride. Work was stopped before the preparation of 2,6-bis (1-pyrrolidinomethyl)-4-(7-chloro-4-quinolylamino)phenol could be demonstrated. (Author)

17A. ACOUSTIC DETECTION

AD-633 581 **Field 17A, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Ohio Univ., Athens. Dept. of Physics.
ACOUSTIC INTERACTION FOR LINEAR AND PLANAR ARRAYS OF SMALL MAGNETOSTRICTIVE-STACK SONAR TRANSDUCERS AT AN AIR-WATER SURFACE.
Technical annual summary rept. no. 2,
by F. B. Stumpf, and L. A. Crum. 1 Jun 66, 38p
Contract Nonr-4419 (01),
Proj. NR-185-601

Descriptors: (*Sonar equipment, *Transducers), (*Acoustics, Sonar equipment), (*Magnetostrictive elements, Tranducers), Air, Water, Surface area, Acoustic impedance.

Experiments and theoretical developments for the acoustic interaction among small 20 kc/sec magnetostrictive-stack sonar transducers in linear arrays of two and three and planar arrays of three and four at an air-water surface are described. The interaction radiation resistance and reactance are studied as functions of number, spacing, relative position and relative phase of the transducers. Analysis and a graph are presented for source and sink regions for transducer operation as a function of spacing and relative amplitude. The theoretical development for this work is based on interacting dipoles in an infinite medium. It is hoped that the results of this study can be used in the design of more efficient sonar arrays. (Author)

AD-633 973 **Field 17A, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Tracor, Inc., Austin, Tex.
ANALYTICAL STUDIES OF DOME-TRANSDUCER INTERACTIONS.
Summary rept.,
by W. C. Moyer. 9 Jun 66, 42p TRACOR-66-342-U
Contract NObsr-91229,
Proj. SF101-03-17,
Task 8139
See also AD-628 326.

Descriptors: (*Sonar domes, *Sound transmission), (*Transducers, Sound transmission), Mathematical models, Performance (Engineering).

This report summarizes analytical studies conducted during the past year to determine the interaction of sonar domes and transducers during transmission. A general description of the mathematical model used in the analysis is given together with some improvements which have been incorporated in the model during the past year. The results of a study of the dependence of certain performance criteria such as directivity index on the parameters of the dome-transducer model is reviewed. In addition, a general description of developments related to the treatment of viscoelastic dome materials and nonconcentric dome shapes is given. The conclusions drawn in the various technical memoranda submitted during the year are restated in this report. Briefly these are: (a) the dome tends to offset the gains in side lobe reduction obtained by shading the transducer elements, and (b) the most important property of the dome model in determining its effects on various transducer performance criteria is its surface density (product of mass density and thickness). These conclusions are supported by numerical results presented in the report. Finally, some recommendations for the continuance of studies of dome-transducer interactions are given. These include an emphasis on the development of a dome-transducer model of more general configuration and the desirability of an experimental program to support the analytical studies. (Author)

17B. COMMUNICATIONS

AD-408 250 **Field 17B, 9D**
CFSTI Price: HC$4.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
DELAY IN DATA TRANSMISSION THROUGH SIMPLE NETWORKS: STEADY STATE CHARACTERISTICS WITH INFINITE NODAL STORAGE,
by B. J. Moriarty. 6 Jun 63, 46p 25G-19
Contract AF 19 (628)-500

Descriptors: (*Data transmission systems, High frequency), Multichannel telephone systems, Data storage systems, Errors, Digital computers, Simulation, Probability, Information theory.

The case is considered of a single constant rate source of data communicating with a single sink of data, via a set of fault-liable HF links which are connected to relay stations equipped with storage facilities. Methods of transmission are used between nodes which effectively result in a node ceasing to transmit when a link becomes faulty and only resuming when a link returns to its normal condition. Thus data will queue at a node when the outgoing link is faulty, and all data reaching the sink is error-free. The network has been simulated on a digital computer using the recorded link behavior of two existing H RTTY links. The probability distributions have been obtained for the queues that arise at the nodes and for the total delay involved in transmitting data from the source to the sink. (Author)

AD-409 819 **Field 17B**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
PERFORMANCE OF COHERENT DETECTION SYSTEMS USING DECISION DIRECTED CHANNEL MEASUREMENT,
by J. G. Proakis, and P. R. Drouilhet Jr. 27 Jun 63, 26p 64G-1
Contract AF 19 (628)-500

Descriptors: (*Signals, Demodulation), (*Phase measurement, Statistical analysis), Signal-to-noise ratio, Communication systems, Decision making, Radio receivers.

A receiver which employs coherent, or synchronous, detection must have a priori knowledge of the phase of the received signal. The receiver acquires this knowledge by performing measurements on the channel. The result of the measurement process is a noisy phase reference which is used by the receiver in the detection processing of the incoming signals. In this report, the effect of using baud decisions to direct the phase measurement process is investigated by means of computer simulation of a coherent communication system employing either orthogonal or phase-reversal signaling. Error rates are given for several signal-to-noise ratios. A major conclusion of this study is that phase measurements obtained through such a decision directed technique results in system error rates which are generally less than error rates of corresponding non-decision directed phase measurement schemes at all signal-to-noise ratios; no threshold exists below which a decision directed phase measurement system deteriorates rapidly. (Author)

AD-410 795 **Field 17B, 9D**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN EFFICIENT DEMODULATOR FOR AN ANALOG PSEUDO-NOISE MULTIPLEX SYSTEM,
by Harry L. VanTrees. 2 Jul 63, 27p 65G-3
Contract AF 19 (628)-500

Descriptors: (*Communication systems, Broadband), (*Modulation, Norse (Radio)), (*Demodulation, Noise (Radio)), Multiplex, Analog systems, Vector analysis, Matrix algebra, Filters (Electromagnetic), Linear systems, Phase modulation, Nonlinear systems, Signal-to-noise ratio, Demodulators.

The advantages of wide-band pseudo-noise communications system are well known. A disadvantage which has restricted its use is the bandwidth requirement. In order to compensate for the large bandwidth, one may put demodulation techniques, each carrier acts as an uncorrelated noise to every other carrier. The report derives an efficient demodulation technique for an analog pseudo-noise system. A rigorous analysis of the system behavior was not performed. It is felt that the concept involved is new and interesting and should be presented in its current state of development. (Author)

AD-416 647 **Field 17B, 9D**
CFSTI Price: HC$11.60
Cooley Electronics Lab., Univ. of Michigan, Ann Arbor.
STUDIES IN DIGITAL COMMUNICATIONS. PART I: FEASIBILITY OF ASYNCHRONOUS MULTIPLEXING. PART II: PERFORMANCE OF HIGH SPEED DIGITAL COMMUNICATIONS OVER TROPOSCATTER LINKS,
by M. P. Ristenbatt, and K. A. Haines. Aug 63, 113p Technical rept. TR-143, 4951-1-T
Contract DA-36-039-sc-89168

Descriptors: (*Speech transmission, Multiplex), Synchronizing switches, Digital computers, Analog-digital computers, Digital systems, Theory, Synchronization (Electronics), Digital-to-analog converters, Signal-to-noise ratio, Attenuation, Speech representation, Voice communication systems, Communication systems.

Part I describes experiments and calculations aimed at demonstrating the feasibility of asynchronous time multiplexing for multichannel speech. The work here generally served to elaborate on the theoretical analysis and predictions made previously, and demonstrated them in the laboratory. The experiments tested various aspects of the method, and culminated in a realistic multichannel experiment with external coded speech signals. The major feasibility demonstrations were done by using a digital computer with A-D equipment. However, an analog extremal coding system was built in order to demonstrate the equipment simplicity. The work here showed that asynchronous time multiplexing is feasible, under the conditions treated, for systems having as few as 24 sources. It was concluded that the advantage of this method over synchronously multiplexed PCM is about 2.7 for 100 sources, and 2.1 and 24 sources. Increases in this advantage should be possible with system improvements. The speech quality with this advantage is not distinguishable, with casual listening, from that of the usual PCM. (Author)

AD-633 560 **Field 17B, 9E, 22B**
CFSTI Prices: HC$6.00 MF$1.50
Hughes Aircraft Co., El Segundo, Calif. Space Systems Div.
MARK IV TERMINAL.
Final rept.
Apr 65, 251p SSD-5165R
Contract DA-28-043-AMC-00121 (S)

Descriptors: (*Synchronous satellites, *Global communication systems), (*Communication satellites (Active), Ground support equipment), (*Radio stations, Mobile), Military requirements, Radio communication systems, Radio equipment, Mobility, Systems engineering, Performance (Engineering), Communication systems.

Identifiers: Mark IV terminal.

The success of the NASA/Hughes Syncom satellite program created interest regarding the feasibility of a fully operational system of synchronous satellites encircling the earth to provide instant communications 24 hours per day. Such a system was desirable for not only its inherent commercial capabilities, but also as a strategic communications network for military utilization. The U. S. Army (SATCOM Agency at Fort Monmouth, New Jersey) initiated a feasibility investigation. Because of the requirement for any communications satellite to transmit to and from ground stations, the most critical requirement was that of a small transportable station which could be utilized virtually at any spot on earth within the electronic visibility of Syncom's coverage, including the United States. A 10-foot reflector antenna system was constructed and successfully demonstrated its terminal capabilities.

AD-633 649 **Field 17B, 5H**
CFSTI Prices: HC$1.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART VII: COMPARISON OF DISPLAYS AT 945- AND 525-LINE RESOLUTIONS,
by D. Shurtleff, and D. Owen. May 66, 22p TM-4213
Contract AF 19 (628)-5165,
Proj. AF-7030
ESD TR-65-137
See also AD-633 144.

Descriptors: (*Television display systems, Resolution), Character recognition, Linear systems, Effectiveness, Reading, Brightness, Visibility, Identification, Analysis of variance.

Identifiers: Legibility.

The legibility of Leroy alphanumerics was determined for 6, 8, 10, and 12 active scan lines per symbol height on a good quality 945-line television system. These results were compared with those of a similar study in which an inexpensive commercial 525-line television system was used. One group of subjects identified symbols displayed by the 945-line system while a second group identified symbols displayed by the 525-line system. The symbols were presented singly, and the speed and accuracy with which the subjects were able to identify them were recorded. The results showed that, even with good quality television, identification performance deteriorated for resolutions lower than 10 lines per symbol height. Performance for the two television systems was similar for 8, 10, and 12 lines per symbol height; but at 6 lines per symbol height, performance was better for the 945-line television than it was for the 525-line television system. As with previous experiments in this series, 10 lines per symbol height was the lowest resolution recommended for television displays. (Author)

AD-633 678 **Field 17B, 9B, 9D**
CFSTI Prices: HC$3.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge.
OCAS - ON-LINE CRYPTANALYTIC AID SYSTEM.
Master's thesis,
by Daniel James Edwards. May 66, 55p MAC-TR-27
Contract Nonr-4102 (01),
Proj. NR-048-189
Report on Project MAC.

Descriptors: (*Cryptography, *Programming languages), (*Programming (Computers), Cryptography), (*Computers, Cryptography), Information theory, Secret communication systems, Data processing systems, Real time, Television display systems.

Identifiers: OCAS.

Deficiencies of various programming languages for dealing with quantities frequently encountered in cryptanalysis of simple cipher systems are discussed. A programming system is proposed which will permit a cryptanalyst to write and debug programs to aid in the solution of cryptograms or cryptographic systems. The basic elements of the proposed programming system are discussed in detail. They include: (1) a programming language to handle both algebraic quantities and character strings, (2) a display generator to permit quick specification of a display frame containing both alphanumeric strings and numerical data for an on-line CRT display device, and (3) an on-line program to control operation of the system and aid in debugging programs written in the proposed language. (Author)

AD-633 711 **Field 17B, 9B**
CFSTI Prices: HC$2.00 MF$0.50
Electronic Associates, Inc., Princeton, N. J.
VOICE ACTUATED ADDRESS MECHANISM.
Rept. no. 3 (final) 1 Mar 65-28 Feb 66,
by Donald Fraipont. 31 Mar 66, 43p
Contract DA-28-043-AMC-01223 (E),
Proj. DA-1P6.20501.A448.02.20
See also AD-625 730.

Descriptors: (*Speech recognition, *Telephone communication systems), Feasibility studies, Vocabulary, Input-output devices, Simulation, Voice communication systems, Learning, Adaptive systems, Computer storage devices, Digital systems, Programming (Computers).

This is the third and final progress report relating to the development of a Simulation of a Voice Actuated Address Mechanism. An overall summary of the entire project is included here along with the third phase experiments of the simulation. All third phase work was pointed toward improving the extrapolated recognition rate to a practical field usage level. The final results obtained for ten new speakers each voicing the fifteen word vocabulary twice were: Recognition Rate = 87.3%, Reject Rate = 6.7%, Error Rate = 6.0%. These results, while not yet at a field use level, are better than any previously published figures relating to similar experiments. (Author)

AD-633 833 **Field 17B, 9D, 6P**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART IX. THE EFFECTS OF RESOLUTION, SIZE, AND VIEWING ANGLE OF LEGIBILITY,
by Donald Shurtleff, Marion Marsetta, and Diana Showman. May 66, 47p MTR-5
Contract AF 19 (628)-5165,
Proj. AF-7030
ESD TR-65-411

Descriptors: (*Television display systems, *Resolution), Information theory, Visual perception, Printing, Graphics, Reading, Psychology, Data transmission systems, Display systems, Electron optics, Visibility.

An investigation was made to determine the visual sizes required for the identification of standard and revised Leroy alphanumerics, which were televised at resolutions of 10, 8, and 6 lines per symbol height. The visual size needed for 99-percent identification accuracy was similar for resolutions of 10 and 8 lines, but a significantly larger visual size was required for symbols resolved by 6 lines. There were no significant differences in visual sizes required for identification of standard versus revised Leroy symbols at any value of resolution. The findings were used to calculate the effective area for viewing televised symbols. (Author)

AD-633 851 **Field 17B, 9D, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART III. LINE SCAN ORIENTATION EFFECTS,
by B. Botha, D. Shurtleff, and M. Young. May 66, 22p W-06774-Pt-3
Contract AF 19 (628)-5165,
Proj. AF-7030
ESD TR-65-138-Pt-3
See also AD-633 833.

Descriptors: (*Television display systems, *Resolution), (*Electron optics, Television display systems), Information theory, Visual perception, Printing, Graphics, Reading, Psychology, Data transmission systems, Display systems, Visibility, Electron optics.

This report delineates effects upon letter legibility produced by horizontal, oblique, and vertical simulated linear TV scan lines. Horizontal lines were parallel to letter bases; the angle between letter bases and oblique lines was 45 degrees; and vertical lines were perpendicular to the letter bases. The results indicate that letter legibility, as measured by response accuracy and letter identification reaction time, is not affected to any significant degree by the scan line angle. In general, the oblique lines yielded the best legibility scores particularly for brief letter exposure times. The main finding of the study was that certain letters remain highly legible regardless of the scan line orientation used for their presentation, and, therefore, are uniquely suitable for TV display. (Author)

AD-633 853 **Field 17B, 9D, 6P**
CFSTI Prices: HC$1.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART IV. THE EFFECTS OF BRIGHTNESS, LETTER SPACING, SYMBOL BACKGROUND RELATION AND SURROUND BRIGHTNESS ON THE LEGIBILITY OF CAPITAL LETTERS,
by D. Shurtleff, B. Botha, and M. Young. May 66, 25p W-06899
Contract AF 19 (628)-5165,
Proj. AF-7030
ESD TR-65-134
See also AD-633 851.

Descriptors: (*Television display systems, *Resolution), Information theory, Visual perception, Brightness, Printing, Graphics, Reading, Psychology, Data transmission systems, Display systems, Visibility, Electron optics.

Two exploratory studies are reported in which the effects of brightness, letter spacing, symbol background relation, and surround brightness on legibility were determined. As a measure of legibility, both studies used the reciprocal of the visual angle subtended at the eye by capital letters when the subject identified correctly 50 percent of the letters in a matrix. A matrix consisted of 20 letters arranged in 4 rows and 5 columns. The first study showed that legibility was significantly altered by brightness, spacing, and symbol background relations. The complexity of the effects of each of these factors was shown by the significant interactions among them. The second study showed surround brightness for the light letters on a dark background to be significant factor in legibility. (Author)

AD-633 855 **Field 17B, 9D, 6P**
CFSTI Prices: HC$2.00 MF$0.50
Mitre Corp., Bedford, Mass.
STUDIES OF DISPLAY SYMBOL LEGIBILITY. PART VI. LEROY AND COURTNEY SYMBOLS.
Technical rept.,
by D. Shurtleff, and D. Owen. May 66, 39p TM-4212
Contract AF 19 (628)-5165,
Proj. AF-7030
ESD TR-65-136
See also AD-633 853.

Descriptors: (*Television diaplay systems, *Resolution), Information theory, Visual perception, Printing, Graphics, Reading, Psychology, Data transmission systems, Display systems, Electron optics, Visibility.

At vertical resolutions of 12-, 10-, 8-, and 6-scan lines per symbol height, the legibility of Courtney alphanumeric symbols, designed especially for

television, was compared with that of standard Leroy symbols. These symbols were presented singly on a 525-line TV monitor, and the speed and accuracy with which they were identified by groups of subjects having normal vision were recorded. A group of subjects viewed only the Courtney symbols, while another viewed only the Leroy. The results showed that, at any resolution value, identification of Courtney symbols was no better than for Leroy. Some practice was required with the Courtney symbols before it was possible to obtain a performance equal to that of the Leroy. This study supports the findings of other experiments: that a resolution of 10 lines per symbol height remains the lowest value recommended for TV displays. (Author)

N66-21691 **Field 17B**
CFSTI Prices: HC$5.00 MF$1.00
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SYNCOM ENGINEERING REPORT. VOLUME I.
Mar 66, 165p NASA-TR-R-233

Descriptors: *Control system, *Engineering development, *Ground station, *Synchronous communications (Syncom) Satellite, *Telemetry.

N66-22350 **Field 17B**
CFSTI Prices: HC$6.00 MF$1.25
Radio Corp. of America, Princeton, N. J. Astro-Electronics Div.
COLOR TELEVISION STUDY.
Final rept., Nov 65-Mar 66,
by A. Bedford, J. Broderick, R. Kell, J. Bingley, andJ. Kara. 31 Mar 66, 205p AED-R-2907
Contract NAS9-5342
NASA CR-65318

Descriptors: *Lunar orbit, *Color television, *Earth orbit, *Television camera.

PB-169 054 **Field 17B, 4B, 13J**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Corp., El Segundo, Calif. Techical Operations.
BUOY COMMUNICATION SYSTEM,
by E. M. Polzin. 14 Apr 65, 30p ATR-65 (7060)-7
Contract Cwb-10857

Descriptors: (*Buoys, Data transmission systems), (*Data transmission systems, Meteorology), Radio receivers, Communication satellites (Active), Radio transmitters, Antenna configuration.

This report determines the buoy transmitter power, receiver sensitivity, and antenna system in an operational communication system with a synchronous satellite. The buoy takes readings on the weather in its area and reads out this information to the satellite when interrogated. (Author)

AD-406 108 **See Field 9E**

AD-633 496 **See Field 9A**

AD-633 696 **See Field 20N**

AD-633 775 **See Field 9C**

AD-633 965 **See Field 17G**

AD-633 997 **See Field 22B**

17E. INFRARED AND ULTRAVIOLET DETECTION

AD-441 646 **Field 17E, 9A, 20L**
CFSTI Prices: HC$5.60
Honeywell Research Center, Hopkins, Minn.
THIN FILM IMAGE CONVERTER.
Interim technical progress rept. no. 4, 24 Jan-23 Apr 64,
by Paul W. Kruse, Fred C. Pribble, andRichard G. Schulze. 20 May 64, 56p
Contract DA-44-009-AMC-168 (T),
Proj. 8F23-11-001-07

Descriptors: (*Infrared detectors, Photoelectric cells (Semiconductor)), (*Photoelectric cells (Semiconductor), Infrared detectors), (*Image intensifiers (Electronics), Metal films), Electroluminescence, Arsenic alloys, Germanium alloys, Gallium alloys, Epitaxial growth, Phosphorus alloys, Diodes (Semiconductors), Luminescence, Absorption.

Identifiers: Image converters.

Details of the fabrication and evaluation of a Zn diffused, Te doped GaP diode are presented. The peak of the spectral emission lies at 7700 A at 297 K for a 200 micro amp bias current. With increasing bias the peak shifts to shorter wavelengths. A shift is also observed at 195K. When operated at 77K the spectral peak lies at 6600 A, independent of bias current. The relative intensity at 297 K and 195K is a superlinear function of bias current at low currents. At 77K it is a linear function of current at low currents. GaAs on Ge heterojunctions have been prepared by an open tube technique utilizing a close-spaced transport system. Source and substrate are heated by tungsten lamps. X-ray analyses indicate that the initial growth of GaAs is epitaxial, but as deposition progresses a polycrystalline deposit is formed. A literature survey of the optical properties of GaAs sub x P sub 1-x has been completed. (Author)

AD-461 567 **Field 17E, 9A, 20L**
CFSTI Price: HC$3.60
Honeywell Research Center, Hopkins, Minn.
THIN FILM IMAGE CONVERTER.
Interim technical progress rept. no. 7, 24 Oct 64-23 Feb 65,
by Paul W. Kruse, Harley Cohen, Fred C. Pribble, andRichard G. Schulze. 20 Mar 65, 40p
Contract DA-44-009-AMC-168 (T),
Proj. DA-8F23-11-001-07

Descriptors: (*Infrared detectors, Photoelectric cells (Semiconductor)), (*Photoelectric cells (Semiconductor), Infrared detectors), (*Image intensifiers, Metal films), Epitaxial growth, Gallium alloys, Germanium alloys, Arsenic alloys, Doping, Zinc, Single crystals, Resistance (Electrical), Hall effect, Electroluminescence, Semiconducting films.

Identifiers: Image converters.

Evaluation of the electrical properties of n-GaAs on p-Ge epitaxial layers has continued. By studying the influence of substrate resistivity upon the current-voltage characteristics, it has been determined that a p-n junction is formed in the Ge during growth on layers whose resistivity is greater than 0.002-0.004 ohm-cm. Diffusion of Zn into the GaAs epitaxial layers failed to produce good rectification characteristics. Spectrographic analysis, together with Hall and resistivity measurements, revealed the GaAs layers to contain an extremely high concentration of Ge. Initial steps taken to grow epitaxial layers of Ge on GaAs have met with little success. An analysis of the resolution limitation of the TFIC caused by lateral current flow in the p-Ge layer revealed that acceptable resolution can be obtained at 0.2 v forward bias. (Author)

AD-474 878 **Field 17E, 9A, 20L**
CFSTI Prices: HC$7.60 MF$0.75
Honeywell Research Center, Hopkins, Minn.
THIN FILM IMAGE CONVERTER.
Interim technical progress rept. no. 8, 24 Feb-23 Aug 65,
by Paul W. Kruse, Fred C. Pribble, Spencer B. Schuldt, andRichard G. Schulze. 20 Sep 65, 79p
Contract DA-44-009-AMC-168 (T),
Proj. DA-8F23-11-001-07

Descriptors: (*Infrared detectors, Photoelectric cells (Semiconductor)), (*Photoelectric cells (Semiconductor), Infrared detectors), (*Image intensifiers, Metal films), Electroluminescence, Diodes (Semiconductors), Single crystals, Crystal growth, Epitaxial growth, Germanium alloys, Gallium alloys, Arsenic alloys, Hall effect, Semiconducting films.

Identifiers: Image converters.

The epitaxial growth of Ge on GaAs has been studied. Although both open-tube and closed-tube growth methods were attempted, only by the former could single crystal layers be prepared. The Ge layers were invariably n-type regardless of the type of the source Ge. Hall effect studies failed to identify the unknown donor. The current-voltage characteristics of n-Ge-p-GaAs heterojunctions have been compared to those of n-Ge-n-GaAs heterojunctions. In contrast to the former, the latter have higher leakage currents with softer breakdowns in the reverse bias direction and different slopes of the forward characteristics. The gain and resolution of a broad area phototransistor under low and moderate illumination have been analyzed. Expressions have been developed which relate these parameters to the electrical properties of the emitter and base regions. An analysis of the problem of carrier transport across a reverse-biased heterojunction has been initiated. The influence of the potential discontinuity arising from the difference in electron affinities of the materials comprising the heterojunction is under investigation. The bibliography on electroluminescence contained in prior reports has been updated. A bibliography of research on heterojunctions has been compiled. (Author)

17F. MAGNETIC DETECTION

AD-633 896 **See Field 8N**

17G. NAVIGATION AND GUIDANCE

AD-633 965 **Field 17G, 6G, 17B, 1B K**
CFSTI Prices: HC$1.00 MF$0.50
Marine Corps Landing Force Development Center, Quantico, Va.
EMERGENCY EVACUATION MISSION HELICOPTER SIGNALING LIGHT.
Final rept.
1966, 13p
Proj. 54-66-05

Descriptors: (*Signal lights, *Night landings), (*Helicopters, Night landings), (*Rescues, Helicopters), Position finding, Armed forces operations, Marine corps, Colors.

Identifiers: M-227 signals.

Conclusions: (a) The standard issue Signal Lamp M-227, using the white light, can be seen and identified by a helicopter flying at 2000 feet MSL at a distance of 8-10 miles, visibility permitting. (b) The Signal Lamp M-227, using the red filter can be seen and identified by a helicopter flying at 2000 feet MSL, at a distance of 3-5 miles, visibility permitting. (c) The standard military flashlights can be seen and identified by a helicopter flying at 2000 feet MSL at distances of 3 miles with the white light and 1 mile with the red light, visibility permitting. (d) The Signal Lamp M-227 can provide initial site acquisition for the helicopter at ranges of 8-10 miles and can provide directional navigational assistance to within 1/2 mile of the landing site. (e) The Signal Lamp M-227 provides for greater security during use than do the standard hooded military flashlights. Recommendations: (a) That the Signal Lamp Equipment SE-11/SE-11A be adopted for use as an emergency evacuation mission helicopter signaling light with an added capability as a visual communications device. (b) That the recommended allowances for the Signal Lamp Equipment SE-11/SE-11A be adopted. (c) That the recommended concept of employ-

ment for the Signal Lamp Equipment SE-11/SE-11A be adopted.

N66-21697 **Field 17G**
CFSTI Prices: HC$2.00 MF$0.50
TRW Systems, Redondo Beach, Calif.
NAVIGATION EXPERIMENT UTILIZING. RELAY II SATELLITE.
Apr 66, 28p
Contract NAS5-9503
NASA CR-429

Descriptors: *Navigation system, *Range measurement, *Relay II Satellite, *Round-trip trajectory.

N66-21701 **Field 17G**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
LINEAR THEORY OF IMPULSIVE VELOCITY CORRECTIONS FOR SPACE MISSION GUIDANCE,
by L. S. Cicolani. Apr 66, 46p NASA-TN-D-3365

Descriptors: *Guidance and control, *Linear equation, *Midcourse guidance, *Orbital velocity, *Space mission.

N66-22213 **Field 17G**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
SIMULATION STUDIES OF SST TERMINAL AREA NAVIGATION IN THE ATC SYSTEM,
by M. C. Fischer, R. H. Sawyer, and J. P. Obrien. 1965, 30p NASA-TM-X-56659
Prepared in cooperation with Federal Aviation Agency, Washington, D. C. Prepared for presentation at the IATA Tech. Conf. (16th), Miami Beach, Fla.

Descriptors: *Airport, *Supersonic transport, *Air traffic control.

N66-22238 **Field 17G**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Washington, D. C.
CONTROL AND GUIDANCE RESEARCH AT NASA,
by C. H. Gould. 1965, 15p NASA-TM-X-56679
Prepared for presentation at the International Meeting on Automatic Control in the Peaceful Uses of Space, Stavanger, Norway, Jun 1965.

Descriptors: *NASA program, *Space flight, *Guidance ; control.

PB-169 805 **Field 17G, 12A**
CFSTI Prices: HC$11.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
A GENERALIZED STATISTICALLY OPTIMUM VELOCITY-INERTIAL SYSTEM,
by William A. Porter. Apr 61, 112p Rept. no. 2900-236-T
Contract DA-36-039-sc-78801
AD 254 612
Rept. of Proj. MICHIGAN.

Descriptors: (*Inertial navigation, Experimental design), (*Inertial guidance, Experimental design), Velocity, Doppler systems, Calculus of variations.

Identifiers: Michigan project.

The variational calculus techniques of Wiener-Kolmogoroff optimum filter theory are used to develop the statistically optimum form of a generalized hybrid velocity-inertial system which may be used for a wide range of applications including any linear combination of acceleration, velocity, or vertical-reference sensing. The form of the system considered encompasses pure inertial, pure doppler, and a large family of doppler-inertial hybrid systems. The general system form is developed by employing two unspecified filters to mix the inertially derived signal with the signal from the auxiliary velocity sensor. The algebraic sum of the two unspecified filter transfer functions must total unity at all frequencies if dynamic errors due to vehicle motion are to be avoided. With this restriction and through consideration of the general system, a single general error equation is found which represents the system error for each of the above system forms and applications. The generalized system representation is further developed by removing the previous restriction on the filter transfer functions, thus allowing forced dynamic errors and their effects on system performance to be considered. These dynamically nonexact systems can be studied within the generalized framework without modifying the principles involved. (Author)

AD-407 437 **See Field 1C**

AD-416 596 **See Field 22C**

AD-633 684 **See Field 22C**

17H. OPTICAL DETECTION

AD-411 384 **Field 17H, 20F**
CFSTI Price: HC$4.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
SIGNAL DETECTION BY COMPLEX SPATIAL FILTERING.
Rept. on Proj. Michigan,
by A. B. Vanderlugt. Jul 63, 47p Rept. no. 2900-394T
Contract DA-36-039-sc-78801, AF 33 (616)-8433

Descriptors: (*Detection, Signals), (*Optical filters, Linear systems), Theory, Integral transforms, Lenses, Frequency, Bandwidth, Pulse discriminators, Mathematical models, Signal-to-noise ratio, Monochromatic light, Coherent scattering, Mirrors, Collimators, Low frequency, Integrals.

Identifiers: Michigan project.

Integrated descriptions of the problem of signal detection, the optimum linear filtering process, a coherent optical system which accomplishes this filtering process, and a technique for realizing the required complex filter are reported. Experimental results show that the theory is valid. A treatment of the Fourier transforming property of lenses which is general enough that complete optical systems can be evaluated on the basis of frequency response and region of space-invariant operation is included. The experimental results obtained to date indicate that this technique provides an excellent two-dimensional filtering capability that will play a key role in problems such as shape recognition and signal detection. (Author)

AD-437 791 **Field 17H, 20F**
CFSTI Price: HC$1.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
EFFECT OF SURFACE DEFORMATIONS IN ROTATING OBLIQUE SCANNING MIRRORS ON IMAGE QUALITY IN FLYING-SPOT SCANNERS,
by William L. Brown, Max E. Bair, and Richard F. Nalepka. Apr 64, 16p Rept. no. 2900-469-T
Contract DA-36-039-sc-78801,
Proj. Michigan

Descriptors: (*Mirrors, Optical scanning), (*Optical scanning, Mirrors), Rotation, Prisms (Optics), Resolution, Experimental data, Theory, Deflection, Deformation, Optical equipment, Optical phenomena, Errors, Mathematical prediction, Quartz, Optical images, Degradation.

Identifiers: Michigan project.

An experimental and theoretical program concerning the distortion of a deviating flat mirror under high-speed rotation about an axis at 45 degrees to its normal is discussed, and the results are compared. The degradation in image quality imposed by the distortions in such mirrors can be predicted to a fair degree of accuracy by using a relatively simple function which relates the contributing factors to the image degradation. (Author)

AD-446 626 **Field 17H, 9B**
CFSTI Price: HC$2.60
Michigan Univ., Ann Arbor. Inst. of Science and Technology.
DATA REDUCTION BY COHERENT OPTICAL SYSTEMS.
Memo. Rept.,
by A. VanderLugt, and F. B. Rotz. Aug 64, 22p Rept. nos. 2900-466-R, 4594-40-R
Contracts DA-36-039-sc-78801, AF 33 (616)-8433,
Proj. DA-3D5801001
Rept. on Proj. Michigan.

Descriptors: (*Data processing systems, Optical instruments), (*Optical instruments, Data processing systems), Statistical analysis, Statistical functions, Interferometers, Data processing systems, Filters (Electromagnetic wave), Optical phenomena, Lenses, Pattern recognition, Fourier analysis, Computer logic, Sequences, Atmospheric motion, Spectrum analyzers.

Identifiers: Michigan project.

Coherent optical systems are useful in performing two major operations in data reduction: spectral analysis and linear filtering. The latter operation includes convolution, autocorrelation, and cross correlation. This paper will emphasize some new developments which have bearing on data reduction, while referring only briefly to the theory behind coherent optical systems. Of particular interest is the development of a technique which allows more general operations by linear filtering. Examples of spectral analysis and character recognition will be presented. (Author)

AD-633 667 **See Field 22A**

17I. RADAR DETECTION

AD-417 559 **Field 17I**
CFSTI Price: HC$6.60
Lincoln Lab. Mass. Inst. of Tech., Lexington.
IMPROVEMENT OF THE MEASUREMENT CAPABILITY OF THE UHF RADAR AT WALLOPS ISLAND,
by J. Freedman. 10 Apr 63, 63p Technical rept. TR-305
Contract AF 19 (628)-500, ARPA order-13

Descriptors: (*Radar echo areas, Reentry vehicles), (*Radar tracking, Radar equipment), Ionization trails, Scattering, Transmission lines, Radar transmitters, Synchronization (Electronics), Delay lines, Radar receivers, Multiplex, Pulse generators, Display systems, Recording systems, Doppler effect, Radar duplexers, Measurement, Delay circuits, Ultrahigh frequency, Satellite tracking systems.

Contents: Radar backscatter from re-entry wakes, and Modifications needed to improve the range resolution and doppler ambiguity of the UHF radar at Wallops Island; Microwave Component Modifications: Transmission lines, Duplexer, and Parametric amplifier and mixer; Transmitter Modifications: Transmitter driver, Final amplifier and modulator, Transmitter synchronizer and range delay unit, and Frequency synthesizer; Receiver: Multiplex and quadrature-video chassis, Multiplex timing and sample-and-hold circuits, and Test pulse generator; Display and Recording Equipment. (Author)

AD-433 714 **Field 17I, 20N**
CFSTI Price: HC$3.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
ELECTROMAGNETIC BACKSCATTERING CROSS SECTION OF A CIRCULAR CYLINDRICAL SECTION,
by S. L. Borison. 18 Feb 64, 36p Group rept. GR-1964-14
Contract AF 19 (628)-500
ESD TDR-64-36, N64 22239

Descriptors: (*Electromagnetic waves, Backscattering), (*Radar echo areas, Cylindrical bodies), Integrals, Reduction, Guided missile detection.

Identifiers: Defender project.

The electromagnetic backscattering cross section of a perfectly conducting circular cylindrical section is expressed in the Kirchoff approximation. The cross section for incidence at an arbitrary angle in either a longitudinal or a transverse plane is related to a geometrical structure integral. Using methods of contour deformation, this integral is approximated for the case of large linear dimensions compared to the incident wavelength. (Author)

AD-633 540 **Field 17I, 20N**
CFSTI Prices: HC$2.00 MF$0.50
Institute for Defense Analyses, Arlington, Va. Research and Engineering Support Div.
RADAR MASKING BY EARTH'S TERRAIN.
Research paper,
by John J. Martin. Mar 66, 38p RP-P-253, IDA/HQ-66 4710
Contract SD-50,
Task T-12

Descriptors: (*Radar, Site selection), (*Radar interference, *Terrain), Maps, Map reading, Electromagnetic compatibility, Radar signals, Propagation.

The masking of a radar's search volume by earth's terrain is a problem of interest in the placement of radars. In practice, exhaustive surveys and modelled operations may be carried out before final placement is made; it is not the intention of this paper to try to obviate such surveys, but to provide a means based on earth's surface elevation data--such as from contour maps--to determine the sensitivity of a radar's location to its performance, i.e., to give some measure to the intuition which says it's better to be on a hill than in a hole. (Author)

AD-633 634 **Field 17I, 20F, 20E**
CFSTI Prices: HC$1.00 MF$0.50
Lincoln Lab., Mass. Inst. of Tech., Lexington.
RADAR RANGE EQUATIONS FOR NARROW-BAND OPTICAL SOURCES.
Technical rept.,
by B. S. Goldstein. 14 Jun 63, 24p TR-319
Contract NAS9-105

Descriptors: (*Infrared optical systems, Range finding), (*Radar equipment, Range finding), Narrowband, Detection, Lasers.

In this report, radar and transponder-type equations are derived for narrow-band optical sources. The range equations may be limited by photons, signal noise, detector noise, or background radiation noise. Under these various conditions, the range equations are given in simple forms as a function of the parameters involved. The conditions under which these various forms apply are also specified. A gallium arsenide infrared radiator has been chosen as a specific example of a narrow-band optical source, and a photomultiplier has been chosen as the detecting device. Several cases are considered: (1) ranging on a sunlit lunar surface; (2) ranging to a vehicle against night sky background; (3) transponder ranging. (Author)

AD-633 701 **Field 17I, 15C**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C.
OPTICAL CALIBRATION ANALYSIS OF THE U. S. NAVAL SPACE SURVEILLANCE SYSTEM,
by L. O. Hayden, and T. B. McCaskill. 25 Apr 66, 51p NRL-6385
Proj. RT-8801-001/6521/S434-00-01

Descriptors: (*Space surveillance systems, Calibration), Radar tracking, Navy, Optics, Angle of arrival, Phase (Electronics), Phase measurement, Errors, Statistical analysis.

A preliminary optical calibration of the U.S. Naval Space Surveillance System was made in 1961 using graphical methods. Since then, calibration has been continued using better equipment and data reduction methods to determine more precisely the characteristics of the system. It is shown that the 108-MHz system studied is capable of measuring angles within a standard deviation of 1/2 min of arc at zenith. Electronic calibration methods used in setting up the 108-MHz system are shown to have a mean accuracy of approximately 3.5 percent of a wavelength for baselines up through 520 ft in length. Bias errors for baselines of 1040 ft and longer are larger than for the shorter baselines and must be corrected to obtain maximum accuracy from the system. Baselines in the range of 16 to 520 ft have (for Echo passes) a mean standard deviation of plus or minus 0.034, which is independent of baseline length and angle of arrival and is internal to the system. The random error for longer baselines increases until it reaches a mean standard deviation of plus or minus 0.09 for the 5200-ft baseline. (Author)

N66-21651 **Field 17I**
CFSTI Prices: HC$2.00 MF$0.50
Kansas Univ., Lawrence. Remote Sensing Lab.
FRESNEL ZONE PROCESSING OF SYNTHETIC APERTURE RADAR DATA.
Technical rept.,
by M. D. Buchanan, and R. K. Moore. 3 Jan 66, 31p TR-61-1
Contract NsR-17-004-003
NASA CR-71405

Descriptors: *Fresnel region, *Radar resolution, *Aperture.

N66-22219 **Field 17I**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
GROUND TRACKING OF THE APOLLO,
by F. O. Vonbun. 1965, 43p NASA-TM-X-56661

Descriptors: *Apollo spacecraft, *Spacecraft tracking, *Tracking station, *Spacecraft communication.

AD-421 872 **See Field 9D**

AD-422 263 **See Field 9D**

AD-442 549 **See Field 9E**

AD-461 071 **See Field 20A**

AD-633 610 **See Field 8B**

AD-634 120 **See Field 22C**

17J. SEISMIC DETECTION

AD-286 441 **Field 17J**
CFSTI Price: HC$70.90
Texas Instruments, Inc., Dallas.
SEISMOMETER ARRAY AND DATA PROCESSING SYSTEM,
Final rept. Phase I,
by L. J. Spieker. 1960, 713p
Contract AF 33 (600)-41840, ARPA Order-104-60,
Proj. VT-077

Descriptors: (*Seismographs, Display systems), (*Data processing systems, Seismic waves), Signal-to-noise ratio, Detection.

Results of Phase I of AFTAC Project No. VT/077 directed toward the use of large arrays of seismometers in the nuclear surveillance problem are summarized: (1) formulated criteria for judging the performance of arrays; (2) formulated a working model of signal and noise described in f and k space; (3) developed the theoretical techniques and requirements for optimum linear array processing, and investigated various approaches to array processing in f and k space in the light of the working model of signal and noise; (4) quantitatively evaluated the performance of arrays with one to thirty-seven elements when various approximations to ideal processing are employed; (5) performed a limited analysis of a small sample of noise and signal data from Ft. Sill, Oklahoma, to bring out practical deviations of the actual case from 2 general working models; (6) outlined specifications for a practical prototype signal-processing system; and (7) developed a program for the second phase of this work. (Author)

AD-633 475 **See Field 8K**

18A. FUSION DEVICES (THERMONUCLEAR)

MATT-358 **Field 18A, 20I**
CFSTI Prices: HC$2.00 MF$0.50
Princeton Univ., N. J. Plasma Physics Lab.
BALLOONING INTERCHANGE INSTABILITIES OF MAGNETIZED PLASMAS UNDER GRAVITATIONAL FIELDS,
by S. Yoshikawa. Sep 65, 21p
Contract AT (30-1)-1238

Descriptors: (*Plasma medium, Stability), (*Thermonuclear reactions, Plasma physics).

18B. ISOTOPES

AD-633 785 **Field 18B, 20H**
CFSTI Prices: HC$2.00 MF$0.50
Naval Civil Engineering Lab., Port Hueneme, Calif.
POTENTIAL APPLICATIONS OF RADIOISOTOPES IN THE NAVY.
Technical rept. (Final) Feb 63-Jun 65,
by L. B. Gardner, A. E. Hanna, and H. E. Stanton. May 66, 27p TR-R-445
Proj. Y-F015-12-04-406

Descriptors: (*Radioactive isotopes, *Nuclear industrial applications), Naval research, Tracer studies, Leakage (Fluid), Pipes, Soil mechanics, Materials, Non-destructive testing.

The Naval Civil Engineering Laboratory has conducted a study of the potential applications of isotopic devices and techniques within the Naval Shore Establishment. Radiation characteristics, general applications of isotopic devices, and specific problem areas are discussed. Recommendations are included for the use of surface density and moisture gages in the inspection of compacted earth, and for additional work in the determination of the thickness of in-place steel sheet piling and the thickness and density of concrete. (Author)

MLM-1274 **Field 18B**
CFSTI Prices: HC$2.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY PROGRESS REPORT FOR JULY 1965,
by J. F. Eichelberger, G. R. Grove, and L. V. Jones. 21 Jul 65, 26p
Contract AT (33-1)-GEN-53

Descriptors: (*Isotope separation, Thermal diffusion), (*Neutron activation, Nuclear reactions).

MLM-1287 Field 18B
CFSTI Prices: HC$2.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
MOUND LABORATORY PROGRESS REPORT FOR AUGUST 1965,
by J. F. Eichelberger, G. R. Grove, and L. V. Jones.20 Aug 65, 27p
Contract AT (33-1)-GEN-53

Descriptors: (*Isotope separation, Thermal diffusion), (*Polonium, X-ray diffraction analysis).

18C. NUCLEAR EXPLOSIONS

AD-633 618 Field 18C
CFSTI Prices: HC$4.00 MF$1.00
United Aircraft Corporate Systems Center, El Segundo, Calif. Weapons Effects and Support Systems Dept.
THEORETICAL GROUND SHOCK EFFECTS. VOLUME I. GROUND MOTION IN ELASTIC HALF-SPACES INDUCED BY AIR BLAST.
Final rept.,
by Roger F. Gans, and John A. Brooks. Dec 65, 132p SCR-275-Vol-I
Contract DA-49-146-XZ-220
DASA 1676-I

Descriptors: (*Surface burst, *Soil mechanics), Explosion effects, Loading (Mechanics), Motion, Elasticity, Stresses, Mechanical waves.

The problem of the ground response to the air blast loading caused by a surface nuclear burst in the elastic region was treated using a ground model of elastic half space both layered and non layered. The air blast loading was approximated by a source of acoustic waves in an overlying fluid. The emphasis is directed toward the investigation of surface wave effects. The report includes discussion of the response in terms of velocities and stresses at various points in the media. The data are presented in graphical form and the necessary derivations are given. In addition the nature of the Rayleigh wave is discussed and a simple damping constant for the Rayleigh response is shown to exist naturally in the solutions. (Author)

AD-633 874 Field 18C, 8G
CFSTI Prices: HC$1.50 MF$0.75
Lawrence Radiation Lab., Univ. of California, Livermore.
THE DEFINITION OF TRUE CRATER DIMENSIONS BY POST-SHOT DRILLING.
Final rept.,
by Nicholas M. Short. 6 Jul 64, 58p
AEC WT-1834
Rept. on Project DANNY BOY, Nevada Test Site, 5 March 1962.

Descriptors: (*Cratering, *Nuclear explosions), Basalt, Petrography, Well logging, Fission products, Underground explosions, Test facilities, Nevada.

Identifiers: Danny Boy project.

The Danny Boy event of March 5, 1962, was a nuclear cratering explosion of 0.42-kt yield at a depth of 110 ft in a basalt flow capping Buckboard Mesa in Area 18, Nevada Test Site. In May-June 1962, three slant holes were drilled from the northwest side of the crater lip base into the vicinity of the shot point for purposes of recovering samples for radiochemical yield determination, assessing the fracture state in the inelastic zone, and locating the true crater surface at several points in order to estimate the explosion cavity radius at the time of venting. Percent core recovery data and radiation logs failed to define the fallback-true crater interface nor was any radioactive glass lining the cavity surface found in the cores. Rock in a 2-ft-thick zone immediately beyond this surface was intensely crushed and fractured in a manner readily descernible by a petrographic microscope examination. Core samples from all three holes examined thusly over 1-ft intervals revealed these microfractures to occur consistently at points 35-38 ft radially from the shot point. A radius of 36 plus or minus 2 feet is therefore assigned to the explosion cavity. The true crater (cavity) surface is a hemisphere radially symmetrical about the shot point at depths below approximately 110 ft. (Author)

PB-169 633 Field 18C
CFSTI Price: HC$11.60
Weidlinger (Paul), New York.
CLOSE-IN-EFFECTS OF NUCLEAR EXPLOSIONS. PART I. PARTICLE-IN-CELL METHOD STUDIES FOR ONE AND TWO DIMENSIONAL SPACE-TIME PROBLEMS,
by Melvin L. Baron, Charles P. Lecht, andRichard S. Skalak. May 63, 112p
Contract DA-49-146-XZ-128
AD 224 007

Descriptors: (*Nuclear explosions, Explosion effects), (*Explosion effects, Nuclear explosions), Differential geometry, Programming (Computers).

This report presents a series of studies on several variations of the Particle-In-Cell method as applied to the solution of problems in compressible fluid flow. A Sharp Shock procedure is formulated which allows for the propagation of sharp discontinuities at the wave fronts in the media without the spreading effects associated with the usual Particle-In-Cell approaches. The method is illustrated by applications to simulated excavation problems in one dimensional space-time geometries. The mathematical formulation of a two dimensional space-time problem involving a hydrodynamic model for the extreme close-in region of a nuclear explosion is also presented, together with an outline of the general computer formulation and flow charts for the problem. (Author)

AD-633 511 See Field 13B

AD-633 651 See Field 20I

AD-633 802 See Field 8M

AD-633 875 See Field 18H

AD-633 876 See Field 6R

18D. NUCLEAR INSTRUMENTATION

AD-633 640 Field 18D
CFSTI Prices: HC$5.60 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
AIR BLAST GAGE STUDIES,
by Charles N. Kingery, and Marvin F. Clarke. Jun 54, 56p
Proj. 3.30
AEC WT-742
Rept. on Operation Upshot-Knothole, Nevada Proving Ground, March-June 1953.

Descriptors: (*Pressure gages, (*Airburst), (*Nuclear explosions, Pressure gages), Blast, Performance (Engineering), Measurement.

Identifiers: Upshot-Knothole operation.

The purpose of Project 3.30 of Operation Upshot-Knothole was to develop and proof-test self-recording gages for the measurement of pressure-time and peak pressure in connection with air blast waves from nuclear explosions. To accomplish this purpose, prototypes were manufactured for three types of gages in quantities of 10 to 30. They were employed in numerous ways on several shots to determine their characteristics, limitations and capabilities. A nylon and carbon paper initiation device was used on the pressure-time gages to start the recording disc at a finite time after the detonation of the device. The pressure-time gages were accurate to plus or minus 10 percent and recorded wave shapes very similar to those obtained by more expensive electronic instrumentation. The peak pressure gages were accurate to plus or minus 10 percent and no initiation device was needed. It is concluded that gages of the type tested can give useful data, on tests requiring greater coverage and longer blast lines, with sufficient accuracy and for less expenditure in money, manpower, and time, than is possible with other types of instrumentation. (Author)

AD-633 752 Field 18D, 15B
CFSTI Prices: HC$1.00 MF$0.50
Naval Radiological Defense Lab., San Francisco, Calif.
COMPARISON OF CESIUM IODIDE AND SODIUM IODIDE FOR UNDERWATER RADIATION DETECTION SYSTEMS,
by Edward J. Wesley, and Richard A. Nyberg. 24 Jun 66, 20p USNRDL-TR-1012
Proj. SR-104-03-01,
Task 0584

Descriptors: (*Scintillation counters, Underwater equipment), (*Sea water, *Radioactivity), (*Oceans, Radioactivity), Cesium compound, Sodium compounds, Iodides, Crystal counters, Detectors, Deep submergence, Radiation measurement systems, Radiological warfare.

Comparison is made between NaI and CsI scintillation detectors for application to an ultrasensitive underwater detection system. A series of measurements are reported on the response of each crystal to the gamma rays from 40K distributed in water, the attenuation of the integrated count rate by aluminum and steel absorbers surrounding the detector and the background count rate from contaminants on the crystal-phototube assembly and pressure housings. It is assumed in the discussion that NaI crystals will always have to be protected from thermal and mechanical shock by a pressure vessel and that CsI, which is much less susceptible to these types of shock, can be exposed to the hydrostatic pressures in the ocean without damage. The minimum detectable change in 40K concentration is calculated, based on the measured signal and background counts for a CsI crystal and several NaI assemblies with steel and aluminum pressure vessels. It is concluded that, for deep submergence work with detectors of equivalent size, a CsI system is the most sensitive and when compared in terms of a specific detection capability, the least expensive. To complete the evaluation, the assumption that CsI can be operated to all depths without a pressure vessel must be confirmed. (Author)

AD-633 774 Field 18D, 20L
CFSTI Prices: HC$2.00 MF$0.50
Army Electronics Command, Fort Monmouth, N. J.
STUDY OF CHARGE CARRIER COLLECTION FROM INSIDE AND OUTSIDE THE SPACE CHARGE REGION.
Technical rept.,
by Michael J. Basso. Jan 66, 43p ECOM-2660
Proj. DA-1PO-14501-B11A,
Task 1PO-14501-B11A-01

Descriptors: (*Radiation measurement systems, *Semiconductor devices), (*Carriers (Semiconductors), Radiation measurement systems), Nuclear radiation spectrometers, Space charges, Alpha bombardment, Diffusion, Electric currents.

A theoretical and experimental study of the collection of charge carriers produced within and outside the space charge region of a P-N type solid-state radiation detector by incident energetic alpha particles of 4.98, 4.67, 3.87, 2.98, and 2.31 Mev energy is described. The depth of the space charge region was made smaller by a variable forward bias voltage externally applied. The magnitude of the

applied voltage was smaller than the barrier potential. Measurements were made of the number of collected carriers from inside and outside the space charge region as the depth of space charge region was varied over the range of the incident alpha particle. The measure results show agreement with the theoretical considerations. The collection efficiency of the detector was also investigated and is given, independent of the particle energy, as a function of the applied bias voltage. (Author)

AD-634 040 **Field 18D**
CFSTI Prices: HC$3.00 MF$0.75
Nuclear-Chicago Corp., Des Plaines, Ill.
DEVELOPMENT OF AN AUTOMATIC REMOTE RADIATION MONITORING (ARRM) SYSTEM.
Final engineering rept.,
by Stewart A. Fox. 31 Dec 65, 93p Rept. no. 899085
Contract OCD-OS-63-183

Descriptors: (*Radiation monitors, Automatic), Remote control systems, Design, Civil defense systems, Telemeter systems, Communication equipment.

The report contains engineering and performance data on a prototype remote automatic monitoring system designed for use in local emergency operating centers. The development effort included but was not limited to design and construction of a detection system which transmits digital radiation data on command from a remote monitor location; incorporation of sensor station identification for serial line systems; production of one complete ten sensor station system for field evaluation. The system described will transmit data over commercial telephone lines and provide control for operation of radio frequency communication equipment. An investigation of data storage and retransmission systems was performed. (Author)

LA-3395 **Field 18D**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scinetific Lab., Univ. of California, N. Mex.
RADIATION MEASUREMENTS OF THE EFFLUENT FROM THE KIWI TNT EXPERIMENT,
by R. W. Henderson, and R. V. Fultyn. Oct 65, 42p
Contract W-7405-eng-36

Descriptors: (*Radiation measurement systems, Radioactive fallout), (*Radioactive fallout, Dosimeters).

AD-633 729 **See Field 7D**

HASL-167 **See Field 6R**

18E. NUCLEAR POWER PLANTS

AD-633 885 **Field 18E, 18J, 18L, 7E K**
CFSTI Prices: HC$2.00 MF$0.50
Alco Products, Inc., Schenectady, N. Y.
ANALYTICAL CHEMISTRY PROCEDURES PRIMARY SYSTEM WATER CONTROL, SM-1A PROJECT,
by Julius Chupak. 29 Sep 60, 41p AP-NOTE-283
Contract DA-95-507-eng-1116

Descriptors: (*Nuclear power plants, Reactor coolants), (*Power reactors, Reactor coolants), (*Pressurized water reactors, Reactor coolants), (*Reactor coolants, Chemical analysis), Water, Control, Acids, Chlorides, Electrical conductance, Fission products, Iodine, Oxygen, pH, Solids, Photometric analysis, Ammonia, Hydrazine, Iron.

Identifiers: Army reactors (SM-1A).

The manual is designed to provide a pratical operating guide for process control personnel assigned to the Stationary Medium Power Plant No. 1A, Ft. Greeley, Alaska, as well as to provide a train guide for future field reactor power plants. Analytical procedures included are: acidimetry, chloride, conductivity, fission product iodine, oxygen, pH, total solids, suspended solids, and photometric analysis of ammonia, hydrazine, and iron. A tabular guide for reagent preparation is included.

ANL-7180 **See Field 18J**

18F. RADIATION SHIELDING AND PROTECTION

AD-634 093 **Field 18F, 6R**
CFSTI Prices: HC$4.00 MF$1.00
Naval Radiological Defense Lab., San Francisco, Calif.
RADIOLOGICAL RECLAMATION PERFORMANCE SUMMARY. VOL. I. PERFORMANCE TEST DATA COMPILATION,
by W. L. Owen, F. K. Kawahara, and L. L. Wiltshire. 13 Oct 65, 106p UNSRDL-TR-967-Vol-1

Descriptors: (*Reclamation, Radioactive fallout), (*Radiological contamination, Reclamation), Environmental tests, Experimental data, Recovery, Civil defense systems, Soils.

A great deal of fallout reclamation-performance data was generated over the past decade that is useful to planners of radiological recovery operations. Because it was contained in a variety of reports and documents prepared by different agencies, this material was neither convenient to Civil Defense planners nor was it always available in a comprehensible form. As a first step toward correcting the situation, the volume presents a tabular data compilation summarizing the performance of land reclamation methods and equipment. The tabled entries were gathered from 18 different experiments and field operations. They include those operational and environmental factors known to influence reclamation effectiveness. (Author)

N66-21662 **Field 18F**
CFSTI Prices: HC$4.00 MF$1.00
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
CALCULATION OF THE DEEP PENETRATION OF RADIATION BY THE METHOD OF INVARIANT IMBEDDING.
Doctoral thesis,
by D. R. Mathews. Feb 66, 129p
Grant NsG-496
NASA CR-71388

Descriptors: *Imbedding, *Neutron cross section, *Radiation shielding.

18G. RADIOACTIVE WASTES

K-1651 **Field 18G**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
REMOVAL OF LOW-LEVEL RADIOACTIVE WASTES BY A SANITARY WATER TREATMENT PROCESS,
by N. B. Schultz. 12 Apr 66, 13p
Contract W-7405-eng-26

Descriptors: (*Radioactive waste, Disposal), (*Water supplies, Radioactivity).

K-1661 **Field 18G**
CFSTI Prices: HC$2.00 MF$0.50
Oak Ridge Gaseous Diffusion Plant, Tenn.
FISSILE-MATERIAL CONTAINER AND PACKAGING DEVELOPMENT AND TESTING PROGRAM,
by A. J. Mallett, and S. J. Wheatley. 1 Apr 66, 45p
Contract W-7405-eng-26

Descriptors: (*Containment, Drop testing), (*Reactor operation, Rupture).

IDO-14666 **See Field 13K**

PB-169 880 **See Field 7E**

PB-169 882 **See Field 7E**

18H. RADIOACTIVITY

AD-633 468 **Field 18H, 9A**
CFSTI Prices: HC$3.00 MF$0.75
Naval Radiological. Defense Lab., San Francisco, Calif.
THE EFFECT OF RADIATION INDUCED CHARGE ON TRANSISTOR SURFACES.
Technical rept.,
by Roe J. Maier. 2 Jun 66, 85p USNRDL-TR-997
Proj. SR-007-11-01,
Task 0551

Descriptors: (*Transistors, *Radiation damage), Surfaces, Leakage (Electrical), Band theory of solids, Voltage.

The deleterious effects of 1000 to 10,000 rads absorbed dose on transistors are analytically studied to determine the mechanisms. Several mechanisms for producing surface charge at the transistor junctions are important. The effect of the charge on the width and depth of the channel at the collector junction causes an increase of collector leakage current I sub CBO when the sign of the charge is such as to drive the surface potential toward inversion. Variations of the transistor gain are due to the variations of the surface recombination velocity, which is a function of surface potential. It is suggested that mitigation be achieved by attempting to eliminate the variations of transistor surface potential. This can be accomplished by preventing the charging of the surfaces and surrounding medium. (Author)

AD-633 875 **Field 18H, 18C, 7E**
CFSTI Prices: HC$2.00 MF$0.50
Lawrence Radiation Lab., Univ. of California, Livermore.
DISTRIBUTION OF THE RADIOACTIVITY FROM A NUCLEAR CRATERING EXPERIMENT.
Final rept.,
by John A. Miskel, and Norman A. Bonner. Sep 64, 22p WT-1817
Proj. 21.1
Report on Project Danny Boy.

Descriptors: (*Cratering, Nuclear explosions), (*Radioactive fallout, Underground explosions), Rock (Geology), Basalt, Atomic clouds, Radiochemistry.

Identifiers: Danny Boy project.

Radiochemical analyses were performed on fallout and particulate cloud samples. A few tenths of a percent of the non-volatile fission products and 10-20% of the more volatile species were vented. A large fraction of the non-volatile products fell out within 10 miles, whereas the major portion of the volatile products did not. (Author)

CEX-59.4.17 **Field 18H, 6R**
CFSTI Prices: HC$1.00 MF$0.50
Geological Survey, Washington, D. C.
AERORADIOACTIVITY SURVEY AND AREAL GEOLOGY OF THE DISTRICT OF COLUMBIA AND PARTS OF MARYLAND, VIRGINIA, AND WEST VIRGINIA (ARMS-I),
by Sherman K. Neuschel. May 63, 48p
Prepared in cooperation with Atomic Energy Commission, Washington, D. C. Div. of Biology and Medicine.

Descriptors: (*Radioactivity, Radiation measurement systems), (*Geology, Radioactivity).

Identifiers: Arms I.

CEX-61.6.2 **Field 18H, 6R**
CFSTI Prices: HC$1.00 MF$0.50
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
ALBUQUERQUE-LOS ALAMOS AREA (ARMS-II),
by R. B. Guillou. Apr 64, 51p

Descriptors: (*Radiation measurement systems, Radiobiology), (*Gamma rays, Health physics instrumentation).

Identifiers: Arms II.

CEX-62.6.5 **Field 18H, 6R**
CFSTI Prices: HC$1.00 MF$0.50
Edgerton, Germeshausen and Grier, Inc., Santa Barbara, Calif.
CINCINNATI AREA (ARMS-II),
by R. B. Guillou. Apr 64, 19p
Contract AT (29-1)-1183

Descriptors: (*Radiation measurement systems, Radiobiology), (*Gamma rays, Health physics instrumentation).

Identifiers: Arms II.

HASL-171 **Field 18H, 6R**
CFSTI Prices: HC$7.30 MF$2.00
Health and Safety Lab., New York Operations Office (AEC), N. Y.
FALLOUT PROGRAM QUARTERLY SUMMARY REPORT, DECEMBER 1, 1965-MARCH 1, 1966,
by Edward P. Hardy Jr., and Joseph Rivera. 1 Apr 66, 430p

Descriptors: (*Radioactive fallout, Health physics), (*Radiochemistry, Strontium).

K-1656 **Field 18H**
CFSTI Prices: HC$1.00 MF$0.50
Oak Ridge Gasesous Diffusion Plant, Tenn.
A DETECTOR FOR ALPHA RADIOACTIVITY IN FLOWING WATER,
by G. B. Seaborn. 19 Apr 66, 16p
Contract W-7405-eng-26

Descriptors: (*Radioactivity, Radiation measurement systems), (*Alpha particle detectors, Radiation monitors).

PB-170 553 **Field 18H**
CFSTI Prices: HC$8.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDES D'ANALYSE PAR ACTIVATION LE COMPTAGE DES RADIONUCLEIDES DE PERIODES COURTES. VOLUME I. (PARTIES A ET B) (Analytical Studies by Activation. Counting of Short Half-Life Radio-Nuclides. Volume 1. Parts A and B),
by Eric Junod. Mar 66, 87p CEA-R-2980
Text in French, summary in English.

Descriptors: (*Nuclei, Counting methods), Half life, Radioactivity, France.

Identifiers: Radionucleids.

Since a radio-nuclide of short half-life is characterized essentially by the decrease in its activity even while it is being measured, the report begins by recalling the basic relationships linking the half-life, the counting time, the counting rate and the number of particles recorded. The second part is devoted to the problem of corrections for counting losses due to the idle period of multichannel analyzers. Exact correction formulae have been drawn up for the case where the short half-life radio-nuclide is pure or contains only a long half-life radio-nuclide. By comparison, charts have been drawn up showing the approximations given by the so-called 'active time' counting and by the counting involving the real time associated with a measurement of the overall idle period, this latter method proving to be more valid than the former. A method is given for reducing the case of a complex mixture to that of a two-component mixture. (Author)

ABCC-64-65 **See Field 6R**

AD-416 663 **See Field 9E**

BMI-1761 **See Field 18J**

HASL-167 **See Field 6R**

NAA-SR-11761 **See Field 18N**

PB-169 882 **See Field 7E**

PB-169 984 **See Field 6H**

18I. REACTOR ENGINEERING AND OPERATION

AGN-TM-413 **Field 18I, 18J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. ISOTHERMAL OXIDATION OF HASTELLOY X AT 1750 AND 1850 DEG F IN AIR,
by R. M. Baciarelli. Dec 65, 41p
Contract AT (10-1)-880,

Descriptors: (*Gas-cooled reactors, Reactor materials), (*Oxidation, Metallography).

Identifiers: Hastelloy X.

AGN-TM-414 **Field 18I, 18J, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Nucleonics, San Ramon, Calif.
ARMY GAS-COOLED REACTOR SYSTEMS PROGRAM. STUDIES OF HASTELLOY X CORROSION IN AIR AT 1900 AND 2000 DEG F,
by J. S. Brunhouse. Dec 65, 31p
Contract AT (10-1)-880

Descriptors: (*Gas-cooled reactors, Reactor materials), (*Corrosion resistance, Reactor fuel cladding).

Identifiers: Hastelloy X.

PB-169 879 **Field 18I, 18M**
CFSTI Prices: HC$2.60 MF$0.50
Institutt for Atomenergi, Kjeller (Norway).
ORGANIC COOLED IRRADIATION LOOP IN THE HFR AT PETTEN,
by Torstein Boehler, and Helge Skreppen. Nov 65, 26p KR-82

Descriptors: (*Organic cooled reactors, Operation), (*Test reactors, Operation), Structural parts, Materials, Radiation damage, Reactor coolants, Instrumentation, Norway, Netherlands.

In the High Flux Reactor (HFR), Petten, The Netherlands, an organic cooled irradiation loop was constructed. Spring 1965 the loop went into in-pile operation and is now being used for the irradiation of structural materials. A description of the loop, the operational experience and the irradiation programme are presented in the paper. (Author)

AD-633 996 **See Field 22B**

ANL-7138 **See Field 18J**

ANL-7144 **See Field 18K**

ANL-7180 **See Field 18J**

DP-1028 **See Field 7A**

LA-3476 **See Field 18J**

18J. REACTOR MATERIALS

ANL-6830 **Field 18J, 7A**
CFSTI Prices: HC$3.00 MF$0.50
Argonne National Lab., Ill.
ENGINEERING DEVELOPMENT OF FLUID-BED FLUORIDE VOLATILITY PROCESSES. PART 2. BENCH-SCALE INVESTIGATION OF A PROCESS FOR ALUMINUM-URANIUM ALLOY AND STAINLESS STEEL-CERMET FUELS,
by D. Ramaswami, N. M. Levitz, and A. A. Jonke. Dec 65, 48p
Contract W-31-109-eng-38

Descriptors: (*Fluidized bed processes, Reactor fuels), (*Reactor fuels, Recovery).

ANL-7138 **Field 18J, 18I**
CFSTI Prices: HC$3.00 MF$0.75
Argonne National Lab., Ill.
CATALOG OF NUCLEAR REACTOR CONCEPTS. PART I. HOMOGENEOUS AND QUASI-HOMOGENEOUS REACTORS. SECTION IV. REACTORS FUELED WITH LIQUID METALS,
by Charles E. Tefter, James A. Lecky, and John H. Martens. Jan 66, 86p
Contract W-31-109-eng-38

Descriptors: (*Reactor fuels, Liquid metals), (*Homogeneous reactors, Reactor coolants).

ANL-7180 **Field 18J, 18I, 18E**
CFSTI Prices: HC$3.00 MF$0.50
Argonne National Lab., Ill.
CATALOG OF NUCLEAR REACTOR CONCEPTS. PART I. HOMOGENEOUS AND QUASI-HOMOGENEOUS REACTORS. SECTION V. REACTORS FUELED WITH URANIUM HEXAFLUORIDE, GASES, OR PLASMAS,
by Charles E. Teeter, James A. Lecky, and John H. Martens. Mar 66, 50p
Contract W-31-109-eng-38

Descriptors: (*Homogeneous reactors, Reactor fuels), (*Reactor fuels, Nuclear power plants).

BMI-1761 **Field 18J, 18H**
CFSTI Prices: HC$2.00 MF$0.50
Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF THORIUM-233 U IRRADIATION SPECIMENS,
by Sidney G. Nelson, and Ellis L. Foster Jr. 10 Feb 66, 24p
Contract W-7405-eng-92

Descriptors: (*Uranium alloys, Radioactive isotopes), (*Reactor cores, Thorium alloys).

BNWL-188 **Field 18J, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
A BRIGHT-FIELD, GRAIN STRUCTURE ETCH FOR DELTA-PHASE-STABILIZED PLUTONIUM,
by D. D. Hays. Feb 66, 8p
Contract AT (45-1)-1830

Descriptors: (*Grain structures (Metallurgy), Plutonium), (*Metallography, Reactor materials).

BNWL-191 **Field 18J**
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
EFFECT OF NEUTRON IRRADIATION ON UHTREX GRAPHITE AND CARBON,
by J. W. Helm. Feb 66, 17p
Contract AT (45-1)-1830

Descriptors: (*Reactor fuel elements, Graphite), (*Radiation damage, Carbon).

Identifiers: Uhtrex.

BNWL-203 Field 18J
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
TRANSFORMATION RATES OF PLASTICALLY DEFORMED PLUTONIUM,
by R. D. Nelson. Feb 66, 14p
Contract AT (45-1)-1830

Descriptors: (*Plutonium, Transformations), (*Crystal lattice defects, Plutonium).

BNWL-215 Field 18J
CFSTI Prices: HC$1.00 MF$0.50
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
IRRADIATION-IDUCED CONTRACTION OF GRAPHITES AT HIGH TEMPERATURE FOLLOWING COLD PREIRRADIATION AND INTERMITTENT THERMAL ANNEALS,
by J. H. Cox, and E. M. Woodruff. Jan 66, 17p
Contract AT (45-1)-1830

Descriptors: (*Graphite, Radiation damage), (*Annealing, Graphite).

IS-1325 Field 18J, 11F
CFSTI Prices: HC$2.00 MF$0.50
Ames Lab., Iowa State Univ. of Science and Tech.
DETERMINATION OF LIQUID METAL DIFFUSION COEFFICIENTS BY MOLECULAR DISTILLATION,
by C. H. Buell, and F. O. Shuck. Feb 66, 34p
Contract W-7405-eng-42

Descriptors: (*Liquid metals, Diffusion), (*Zinc, Indium).

LA-3470 Field 18J
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
FISSION COUPLES APPLIED TOWARD REACTOR DIAGNOSTICS AND SAFETY,
by R. G. Morrison, and D. B. Stillman. 15 Jan 66, 31p
Contract W-7405-eng-36

Descriptors: (*Reactor fuels, Fission product activity), (*Fission products, Reactor safety systems).

LA-3476 Field 18J, 11F, 18I
CFSTI Prices: HC$1.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
CORROSION TESTS OF HASTELLOY N, INCONEL 600, AND HYMU-80 EXPOSED TO UCL3-KCL AT 900 DEG C,
by B. J. Thamer. 4 Feb 66, 14p
Contract W-7405-eng-36

Descriptors: (*Corrosion, Reactor materials), (*Fast reactors, Containment).

MIT-334-23 Field 18J
CFSTI Prices: HC$5.00 MF$1.00
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
FRICTION FACTOR AND HEAT TRANSFER CORRELATION FOR IRRADIATED ORGANIC COOLANTS,
by A. H. Swan, and E. A. Mason. Sep 65, 165p
Contract AT (38-1)-334

Descriptors: (*Reactor coolants, Heat transfer), (*Friction, Reactor coolants).

MIT-334-33 Field 18J
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Nuclear Engineering.
IN-PILE LOOP IRRADIATION STUDIES OF ORGANIC COOLANT MATERIALS.
Progress rept. for 1 Jan-30 Sep 65,
by D. T. Morgan. 1 Nov 65, 35p
Contract AT (38-1)-334

Descriptors: (*Reactor coolants, Heat transfer), (*Friction, Reactor coolants).

MLM-1301 Field 18J
CFSTI Prices: HC$2.00 MF$0.50
Mound Lab., Miamisburg, Ohio.
REACTOR FUELS AND MATERIALS DEVELOPMENT PLUTONIUM RESEARCH: JULY-SEPTEMBER 1965,
by L. J. Wittenberg, and G. R. Grove. 11 Mar 66, 22p
Contract AT (33-1)-GEN-53

Descriptors: (*Reactor fuels, Plutonium), (*Plutonium, Reactor materials).

NAA-SR-11805 Field 18J
CFSTI Prices: HC$5.00 MF$1.00
Atomics International, Canoga Park, Calif.
AEC UNCLASSIFIED PROGRAMS.
Quarterly technical progress rept., Oct-Dec 65.
15 Feb 66, 147p
Contract AT (11-1)-GEN-8

Descriptors: (*Reactor system components, Reactor coolants), (*Reactor fuel cladding, Fast neutrons).

AD-633 643 See Field 13H

AD-633 885 See Field 18E

AGN-TM-413 See Field 18I

AGN-TM-414 See Field 18I

ANL-6985 See Field 7D

ANL-7055 See Field 7A

ANL-7144 See Field 18K

DP-1021 See Field 7D

DP-1028 See Field 7A

IS-1287 See Field 20B

NYO-10740 See Field 7A

18K. REACTOR PHYSICS

ANL-7144 Field 18K, 18I, 18J
CFSTI Prices: HC$1.00 MF$0.50
Argonne National Lab., Ill.
THE EFFECT OF INTERFERENCE INTERACTION BETWEEN THE RESONANCES OF 239 PU AND 232 TH ON 239 PU FISSION AND CAPTURE CROSS SECTIONS AND 232 TH CAPTURE CROSS SECTIONS,
by R. S. Singh. Jan 66, 15p
Contract W-31-109-eng-38

Descriptors: (*Fast reactors, Radioactive isotopes), (*Reactor lattice parameters, Doppler effect).

BNWL-193 Field 18K
CFSTI Prices: HC$3.00 MF$0.75
Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.
PHYSICS RESEARCH QUARTERLY REPORT, JULY, AUGUST, SEPTEMBER 1965,
15 Oct 65, 65p
Contract AT (45-1)-1830

Descriptors: (*Reactor system components, Programming (Computers), (*Reactor lattice parameters, Nuclear power plants).

BNL-948 See Field 20G

18L. REACTORS (POWER)

AD-633 885 See Field 18E

18M. REACTORS (NON-POWER)

PB-170 557 Field 18M
CFSTI Prices: HC$8.60 MF$0.75
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
ETUDE DES PARAMETRES 'RHO', 'BETA' ET LAMBDA PILE A EAU LEGERE (Study of the 'rho', 'beta' and lambda Parameters of a Light-Water Reactor).
Doctoral thesis in French,
by Raymond Riche. 6 Sep 65, 88p CEA-R-2883
Text in French; Attached Summary in English.

Descriptors: (*Light water reactors, Reactor lattice parameters), Uranium, Fission products, Neutrons, Equations, France.

The kinetic and perturbation equations are derived from the time-dependent transport equation. Kinetic equations depend only on the ratios a='rho'/'beta' and b='beta/lambda, which are definite, while the reactivity 'rho', the delayed neutron fraction 'beta' and the generation time lambda are expressed in terms of an arbitrary function. The (static) definitions of these parameters, which reduce kineic problems to a set of purely term dependent equations, introduce the 'effective' fraction 'beta'. One way of determining experimentally the ratio b is presented; it consists in analysing the power transient after a rapid variation of the reactivity, caused by the implosion of an empty glass-ball. A simple interpretation is proposed. The apparatus can be transformed easily into a reactimeter. The value of the effective delayed neutron fraction 'beta' has been determined by averaging the reactivity effects of a copper sheet through out the reactor core. Experimental results: b='beta'/lambda =129/sec and beta=0.00795, have been determined on a light-water moderated, enricheduranium fuelled reactor. The calculated values of the effectiveness of delayed neutrons gamma='beta'/beta=1.23 and the generation time lambda=.000059sec agrees fairly well with the experimental results. (Author)

PB-169 879 See Field 18I

18N. SNAP TECHNOLOGY

NAA-SR-11761 Field 18N, 18H, 6R
CFSTI Prices: HC$2.00 MF$0.50
Atomics International, Canoga Park, Calif.
RADIOLOGICAL ASPECTS OF REENTRY BURNUP OF SNAP REACTORS,
by C. A. Willis. 25 Mar 66, 36p
Contract AT (11-1)-GEN-8

Descriptors: (*Auxiliary power plants, Fuel burn up), (*Atmosphere entry, Radioactive fallout).

NAA-SR-11814 Field 18N
CFSTI Prices: HC$3.00 MF$0.75
Atomics International, Canoga Park, Calif.
SNAP-10A FSM-4-SYSTEM TEST,
by Paul L. Soske. 25 Mar 66, 80p
Contract AT (11-1)-GEN-8

Descriptors: (*Auxiliary power plants, Reactor shutdown), (*Reactor system components, Auxiliary power plants).

19A. AMMUNITION, EXPLOSIVES, AND PYROTECHNICS

AD-633 490 Field 19A, 19D
CFSTI Prices: HC$2.60 MF$0.50
Department of the Navy, Washington, D. C.

THE MECHANISM OF ACTION OF EXPLOSION AND PROPERTIES OF EXPLOSIVES,
by G. P. Demiduk. 1966, 28p Translation-1063
O Mehanizme Deistviya Vzryua e Svoistvah Vzryvchatyh Veshchestv, trans. of Vzryvnoe Delo (USSR) n45/2 n. p. n. d.

Descriptors: (*Explosive materials, *Explosions), Shock waves, Compressive properties, Detonations, Energy, USSR, Blast.

Identifiers: Igdanites.

AD-633 567 **Field 19A, 13H**
CFSTI Prices: HC$2.00 MF$0.50
Chamberlain Corp., Waterloo, Iowa. Ordnance Div.
PRODUCTION ENGINEERING OF PROJECTILE, HE, 107-MM, XM502.
Monthly letter rept. no. 6,
by J. O. Vining, and E. J. McElliott. 19 Jan 66, 50p
Contract DA-28-017-AMC-2308 (A)
See also AD-633 568.

Descriptors: (*Steel, Projectiles), (*Mortor ammunition, *Projectiles), Manufacturing methods, Ordnance steel, Heat treatment, Forging, Drawing (Machine processing), Fragmentaton ammunition, Carbon steel, Phosphorus steel cylindrical bodies, Fracture (Mechanics).

Identifiers: M502 cartridges (107 MM), X570 cartridges (107MM).

A quotation detailing the cost of redirecting efforts from the XM502 to the XM570 (BMC) was submitted to Picatinny Arsenal. Mill certifications showed that W1 steel carbon content was 1.27%, above the specified 1.1 to 1.2%. The deviation was allowed. Mill reports and local tests showed that high carbon, high phosphorus steel bars were unsound in the center. The material will be used to check effects of this condition. Four experimental heats of A1S1 06 steel were received, cost-free, for tests. Manufacture and heat treatment of all cylinders neared completion. Work centered on preparation of metallurgical test specimens from heat treated cylinders. Fragmentation testing was completed on two cylinders each made from 52100, 06, 1095 and 9261 steels. Very little activity was expended on the projectile due to the possibility of changing contractual models. (Author)

AD-633 568 **Field 19A, 13H, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Chamberlain Corp., Waterloo, Iowa. Ordnance Div.
PRODUCTION ENGINEERING OF PROJECTILE, HE, 107-MM, XM502.
Monthly letter rept. no. 7,
by J. O. Vining, and E. J. McElliott. 18 Jan 66, 33p
Contract DA-28-017-AMC-2308 (A)
See also AD-633 567.

Descriptors: (*Steel, Projectiles), (*Mortar ammunition, *Projectiles), Manufacturing methods, Ordnance steel, Heat treatment, Fragmentation ammunition, Carbon alloys, Phosphorus alloys, Tool steel, Cylindrical bodies, Impact tests, Fracture (Mechanics), Tensile properties.

Identifiers: M502 cartridges (107 MM), M570 cartridges (107 MM).

Notice was received that the XM570 (BMC) will be the contractual round. Cylinders were made from high carbon, high phosphorus steel bar. These and cylinders from W1 tool steel were sent to a subcontractor for heat treatment. 52100 steel cylinders were heat treated to replace items inadequately heat treated during November 1965. Metallurgical tests continued. Difficulties encountered in sectioning very hard cylinders prompted a search for better cutting techniques. (Author)

AD-633 623 **Field 19A, 20M, 14B, 11F K**
CFSTI Prices: HC$1.00 MF$0.50
Naval Research Lab., Washington, D. C.
EXPLODING WIRE RESEARCH 1774-1963.
Memo. rept.,
by J. R. McGrath. May 66, 19p NRL-MR-1698

Descriptors: (*Exploding wires, Reviews), Naval research, Bibliographies, Vaporization, Electric currents, Explosions, Electrical properties, Vapors, Spectroscopy, Metals, Light, Sources, Shock waves, High temperature research, Ignition, Aerosol generators, Theory, Photochemistry, Electronics, Fuses (Electrical), Photography, Vapor plating, Metallurgy, Test methods, Phase studies, Lasers, Excitation.

A review of Exploding Wire Phenomena (EWP) research is presented. This review covers the work performed from 1774 to the most current publication. Representative and significant studies are cited to indicate the difficulties associated with EWP research and the recent progress made in overcoming them. (Author)

AD-634 002 **Field 19A**
CFSTI Prices: HC$3.00 MF$0.75
Naval Weapons Lab., Dahlgren, Va.
POWER CARTRIDGE HANDBOOK.
1 Jan 64, 91p NAVWEPS-7836-Change 2

Descriptors: (*Cartridges, Handbooks), Cartridges (PAD), Igniters, Propellants, Pressure.

Contents: Percussion ignited cartridges; Stab ignited cartridges: Electrically ignited cartridges; Igniters; Pressure versus loading density in fixed volumes; Cartridge actuated devices; Theoretical optimization of cartridge actuated devices. (Author)

AD-458 854 **See Field 21B**

AD-633 651 **See Field 20I**

19C. COMBAT VEHICLES

AD-633 944 **Field 19C, 11I, 13H, 11C K**
CFSTI Prices: HC$3.00 MF$0.75
Chrysler Corp., Detroit Mich. Defense Operations Div.
POLYETHYLENE LINED TURRET.
Final rept.
22 Jun 66, 92p
Contract DA-20-113-AMC-07809T

Descriptors: (*Tank turrets, Plastic coatings), (*Polyethylene plastics, Extrusion), Shielding, Production, Temperature, Pressure, Annealing, Defects (Materials), Detection, Fracture (Mechanics), Boron.

A production technique was sought for lining a tank turret with high-density polyethylene by an extrusion process for radiation protection. Several problems were encountered including: (1) The construction of the liner in the turret; (2) The extruding of the polyethylene into the sample boxes without forming voids and cracks; (3) Void detection methods. It was found that temperatures, pressures and annealing procedures were very critical in obtaining satisfactory samples. Construction of the liners was important to the flow of the plastic. Seven sample boxes were filled with polyethylene by the extrusion method and none of them were completely satisfactory. It was concluded that the extrusion method of filling a turret liner with polyethylene would not result in a void-free, crack-free liner due to the very critical temperatures, pressures and annealing procedures. The construction and internal configuration of the liners is an important factor in the free flow of the plastic. It is recommended that other methods such as using polyethylene sheets or pouring a polymer liquid into a liner form be given consideration. (Author)

19D. EXPLOSIONS, BALLISTICS, AND ARMOR

AD-633 821 **Field 19D**
CFSTI Prices: HC$5.00 MF$1.00
Foreign Technology Div. Wright-Patterson AFB, Ohio.
THE STRUCTURE OF A DETONATION FRONT IN GASES,
by B. V. Voitsekhovskii, V. V. Mitrofanov, and M. E. Topchiyan. 9 Feb 66, 183p FTD-MT-64-527 TT 66-61423
Edited machine trans. of mono. Struktura Fronta Detonatsii v Gazakh, Novosibirsk 1963 p1-168.

Descriptors: (*Detonations, *Gases), Perturbation theory, USSR, Explosive materials, Combustion, Detonation waves.

The purpose of the report is to present results of investigations of the structure of transverse perturbations of the actual detonation front in gases.

AD-633 881 **Field 19D, 11E**
CFSTI Prices: HC$3.00 MF$0.50
Felters Co., Boston, Mass.
BALLISTIC RESISTANCE OF NEEDLE-PUNCHED NYLON FELTS.
Final rept., Oct 63-Feb 65,
by Richard C. Keith. May 66, 53p TS-137
Contract DA-19-129-AMC-204 (N),
Proj. 1C024401A329-02
USA-NLABS TR-66-39-CM

Descriptors: (*Body armor, Nylon), (*Textiles, Nylon), (*Ballistics, Nylon), Weaving.

Felts made from high tenacity nylon 6,6 (industrial quality), bright, 6-denier filament, three-inch staple, crimpset fiber were found to be the most satisfactory in ballistic resistance, uniformity, and ease of processing among the group studied. Batts that were cross-laid proved to be superior to the parallel-laid batts and equal to a combination of straight- and cross-laid batts. The best felt, from the standpoint of both ballistic resistance and dimensional stability, was produced by needling 4-ounce batts alternately on each side, with 277 penetrations per square inch and a half-inch needle penetration, followed by flat-bed pressing (using 0.29-in spacer bars at 310F for 2-1/2 min) to attain the desired thickness. Producer's virgin waste of the same high tenacity nylon 6,6 appeared to be promising although the test results were inconclusive.

AD-634 017 **Field 19D, 20A, 20D**
CFSTI Prices: HC$2.00 MF$0.50
General Dynamics Corp., San Diego, Calif. General Atomic Div.
PRODUCTION OF STRONGLY OVERDRIVEN PLANE DETONATION WAVES IN CONDENSED EXPLOSIVES.
Final rept.
by Brian Dunne. 1 Nov 65, 37p GA-6798
Contract DA-49-146-XZ-426
DASA 1729

Descriptors: (*Detonation waves, Acceleration), Explosions, Acoustics, Fluid mechanics.

Experiments are described in which a hemispherical detonation wave was gradually transformed into a strongly overdriven plane wave by the use of a high-density confinement nozzle. The resulting wave had a peak pressure of up to two times the Chapman-Jouguet value and a planarity of plus or minus 1 mm over a 4.3 cm diameter. (Author)

AD-634 111 **Field 19D**
CFSTI Prices: HC$1.00 MF$0.50
Naval Ordnance Lab., White Oak, Md.

THE RESISTANCE OF HOLLOW GLASS MODELS TO UNDERWATER EXPLOSIONS AT GREAT DEPTHS. III. SPHERES WITH OVERLAYS,
by Thomas B. Heathcote. 17 May 66, 21p
NOLTR-66-78
Proj. NOL-892/SP

Descriptors: (*Underwater explosions, Spheres), (*Spheres, Explosion effects), (*Glass, Explosion effects), Rubber coatings, Tensile properties.

Hollow glass spheres, 10 inches in diameter, were exposed to implosions of nearby spheres at 7,000, 10,000, and 21,000 ft depths in the ocean. Coatings of butyl and neoprene rubber, and syntactic foam increased the damage resistance at depth slightly; no significant differences among the three coatings nor between 1/2-inch and 1-inch thicknesses were found. Liminted data indicate that resistance to implosions increases with depth. (Author)

LA-3450 **Field 19D, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Los Alamos Scientific Lab., Univ. of California, N. Mex.
THE TWO-DIMENSIONAL HYDRODYNAMIC HOT SPOT. VOLUME III,
by Charles L. Mader. 5 Jan 66, 37p
Contract W-7405-eng-36

Descriptors: (*Detonation waves, Propagation), (*Two-dimensional flow, Equations of state).

AD-633 476 **See Field 20K**

AD-633 490 **See Field 19A**

AD-633 621 **See Field 1C**

AD-633 681 **See Field 21B**

AD-633 693 **See Field 4B**

AD-633 779 **See Field 4B**

AD-633 797 **See Field 4B**

AD-633 798 **See Field 4B**

AD-633 799 **See Field 4B**

AD-633 889 **See Field 4B**

AD-634 065 **See Field 4B**

AD-634 066 **See Field 4B**

AD-634 067 **See Field 4B**

19F. GUNS

AD-633 576 **Field 19F**
CFSTI Prices: HC$1.00 MF$0.50
Naval Weapons Laboratory, Dahlgren, Va.
ANALYTIC SOLUTION OF A SPECIAL GUN PROBLEM.
Technical memo.,
by John Somes. Jul 64, 26p Rept. no. K-47/64
Task WR-4-0046

Descriptors: (*Gun barrels, *Interior ballistics), Gas flow, Projectiles, Functions, Equations of motion, Transformations (Mathematics).

The motion of a projectile in a gun barrel is prescribed so that the motion of the gas in the part of the barrel adjacent to the projectile is given by a simple analytic function. Analytic methods involving the hodograph transformation are employed to determine the motion of the gas in the remaining portion of the barrel. The procedures are carried out explicitly in the case gamma = 5/3.

19G. ROCKETS

AD-633 660 **See Field 16A**

20. PHYSICS

AD-633 668 **See Field 20N**

20A. ACOUSTICS

AD-449 821 **Field 20A, 12A**
CFSTI Price: HC$3.60
Naval Weapons Lab., Dahlgren, Va.
AN ULTRASONIC RAY TRACING PROBLEM,
by James P. Coughlin, and Fred I. Grace. 27 Aug 64, 39p Rept. no. NWL-1935

Descriptors: (*Ultrasonic radiation, Fluid dynamic properties), Mathematical analysis, Fluid flow, Supersonic flow, Subsonic flow, Ellipsoids, Equations, Numerical methods + procedures.

It is required to find the path of an ultrasonic beam projected from an ellipsoid which is moving through a fluid. For subsonic flow the velocity of the fluid is found by separating the variables in LaPlace's equations in semi-elliptic co-ordinates. For supersonic flow the velocity of the fluid was found by a numerical method involving characteristics. The path of the beam was then found by a numerical integration of the ray equation as given by Milne. (Author)

AD-461 071 **Field 20A, 17I**
CFSTI Price: HC$8.60
Stanford Research Inst., Menlo Park, Calif.
TRANSDUCER EVALUATION BY REVERBERATION TANK TECHNIQUES.
Final rept.,
by Eugene M. Spurlock. Feb 65, 82p
Contract NObsr-89004,
Proj. SF001-03-04, PHU-4220
Task 8048

Descriptors: (*Transducers, Sonar equipment), Vibration, Pulse generators, Measurement, Calibration, Acoustics, Tanks (containers).

A method has been developed to measure th total output acoustic power of modern sonar transducers in existing unlined, small-size sonar test tanks. The method depends upon two acoustic measurements: the steady-state reverberant power and the rate at which energy is absorbed by the walls. The energy absorption is determined by measuring the reverberation decay rate. (Author)

AD-474 778 **Field 20A, 13M, 21E**
CFSTI Prices: HC$7.00 MF$1.50
Blume (John A.) and Associates, San Francisco, Calif. Research Div.
STRUCTURAL REACTION PROGRAM NATIONAL SONIC BOOM STUDY PROJECT. SUMMARY, CONCLUSIONS, AND ANALYSIS.
Apr 65, 308p
Contract FA-SS-65-12
FAA SST-65-15-Vol-1
See also AD-474 779.

Descriptors: (*Sonic boom, Buildings), Test methods, State-of-the-art reviews, Design, Damage, Pressure, Walls, Fracture (Mechanics), Foundations (Structures), Construction, Meteorological parameters, Jet fighters, Jet bombers, Brick, Wood, Prefabricated buildings, Jet transport planes, Supersonic planes, Loading (Mechanics), Concrete, Glass, Structural parts, Shock waves, Structures, New Mexico.

The test area included 21 structures varying in design, construction and age. Furniture, mirrors, television sets and other home appliances, dishes, crystal, bric-a-brac and various other items were in the test structures. The test site was exposed to 1494 sonic booms of overpressures ranging from 1.6 to 23.4 pounds per square foot (p. s. f.). Sonic booms and structural material reaction were measured. To study the cumulative effects of repeated sonic booms, 680 successive flights at a scheduled overpressure of 5.0 p. s. f. were generated during one period of the study. It is concluded that no previously undamaged material was identified during the accumulative effects portion of the study. Sonic boom overpressure levels at which incipient effects appear in structures and materials are presented. (Author)

AD-474 779 **Field 20A, 13M, 21E**
CFSTI Prices: HC$6.00 MF$1.25
Blume (John A.) and Associates, San Francisco, Calif. Research Div.
STRUCTURAL REACTION PROGRAM NATIONAL SONIC BOOM STUDY PROJECT. APPENDICES,
Apr 65, 244p
Contract FA-SS-65-12
FAA SST-65-15-Vol-2
See also AD-474 778.

Descriptors: (*Sonic boom, Buildings), Design, Pressure, Specifications, Bibliographies, Jet fighters, Jet bombers, Damage, Shock waves, Structural parts, Jet transport planes, Supersonic planes, Prefabricated buildings, Structures, Tables, New Mexico.

AD-475 662 **Field 20A, 13M, 21E**
CFSTI Prices: HC$6.00 MF$1.25
Blume (John A.) and Associates, San Francisco, Calif. Research Div.
THE EFFECTS OF SONIC BOOM ON STRUCTURAL BEHAVIOR. A SUPPLEMENTARY ANALYSIS REPORT,
Final rept.,
by John H. Wiggins Jr. Oct 65, 206p
Contract FA-SS-65-12
FAA SST-65-18

Descriptors: (*Sonic boom, Buildings), Damage, Shock waves, Damage assessment, Loading (Mechanics), Intensity, Reflection, Pressure, Mathematical prediction, Structures, Resonant frequency, Damping, Resonance, Walls, Soils, Altitude, Time, Theory, Vibration, Stresses, Deflection, Glass, Structural properties, Fracture (Mechanics), Meteorological parameters, Jet fighters, Jet bombers, Statistical analysis, Oklahoma, New Mexico.

Response and Damage data from the Federal Aviation Agency Sonic Boom Tests at Oklahoma City, Oklahoma, and White Sands, New Mexico, are analyzed and effected on structures summarized. Parameters governing the effects on structures summarized. Parameters governing the free-field and near-field boom waves are also studies and their influence on scatter in the data estimated statistically. This report then conservatively summarizes the results in a damage prediction table and chart. Insurance adjusters are given guidance on the treatment of sonic boom damage claims along with the chart. Finally, recommendations for future work in sonic boom, structural behavior studies are made. (Author)

AD-633 675 **Field 20A, 20D**
CFSTI Prices: HC$2.00 MF$0.50
Houston Univ., Tex. Dept. of Mechanical Engineering.
SCALING FACTORS FOR USE WITH RIPPLE TANK STUDIES OF WAVE PROPAGATION IN A FLUID VOLUME.
Technical rept.,
by W. S. Mitchell, and D. Muster. Aug 65, 39p
TR-1
Contract Nonr-4492 (01),
Proj. NR-185-602

Descriptors: (*Sound, Propagation), (*Fluid mechanics, Sound), Surface tension, Test equipment, Test methods.

A study is made of wave propagation on the surface of a liquid in a ripple tank. The waves under study are of the deepwater capillary type (that is, short wave length); their velocity and mode of propagation are influenced by two independent parameters: surface tension and the generated frequency. Since the velocity of wave propagated in a fluid volume is independent of frequency and that of surface waves is not, corrective scaling factors are derived to account for this difference, that is, an expression is developed which correlates the velocity of a wave propagated in a fluid volume with the velocity of a two-dimensional wave on the surface of a fluid. By using properly sized and positioned reflecting boundary surfaces which protrude through the air-liquid interface in the ripple tank, it is possible to study the behavior of sound waves in a fluid volume with prototype reflecting boundary surfaces. A description (including photographs) of the construction details of the particular ripple tank used in the study is given. (Author)

AD-633 786 **Field 20A**
CFSTI Prices: HC$4.00 MF$1.00
Naval Research Lab., Washington, D. C.
EXPLORATION OF MULTI-ELEMENT BROAD BAND TRANSDUCER.
Memo. rept.,
by R. V. Baier, and M. A. Blizard. 8 Mar 66, 149p
NRL-MR-1691
Proj. RR-102-08-41-5226

Descriptors: (*Transducers, Broadband), Sound transmission, Extremely low frequency, Configuration, Effectiveness, Performance (Engineering), Propagation.

The problem is defined as one whereby a broad band transducer is obtained by the use of many small elements, having normal values of mechanical Q, in an array. The technique employed here is one of selecting a set of dissimilar transducer elements and spatially arranging them throughout the array in various distributions. These distributions are selected on the basis of the individual air-resonant frequency of the elements. The behavior of this array, for several frequency distributions, with respect to the element's velocity, radiation load, radiated power, efficiency and transmitting response is presented. The results do indicate the possibility of designing a broad band transducer by multi-element array with some sacrifice in efficiency. (Author)

AD-633 831 **Field 20A, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
PROPAGATION OF A SHOCK WAVE IN AN INHOMOGENEOUS ATMOSPHERE IN THE DIRECTION OF DECREASING DENSITY,
by Yu. P. Raizer. 1966, 17p Translation-2161
TT 66-61461
Rasprostranenie Udarnoi Volni v Neodnorodnoi Atmosfere v Storonu Umensheniya Plotnosti. Trans. of Zhurnal Prikladnoi Mekhaniki i Tekhnicheskoi Fiziki (USSR) n4 p49-56 1964.

Descriptors: (*Shock waves, Propagation), Atmosphere, Detonations, Acoustics, Fluid mechanics, USSR.

AD-633 979 **Field 20A, 20D, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Courant Inst. of Mathematical Sciences, New York Univ., N. Y.
HIGH FREQUENCY SOUND ACCORDING TO THE BOLTZMANN EQUATION,
by Harold Grad. 15 Feb 66, 47p MF-49
Grants AF-AFOSR-815-66, NSF-GP-4960
AFOSR 66-0145
Presented at the SIAM meeting in honor of Richard Courant at New York University on June 8, 1965. To appear in Journal of the Society for Industrial and Applied Mathematics.

Descriptors: (*Sound, Propagation), (*Mathematical models, Sound), High frequency, Boundary value problems, Partial differential equations, Gas flow.

Identifiers: Boltzmann equation.

The boundary value problem of sound generated at an oscillating wall propagating into a half space is solved for a linear Boltzmann equation with a general cutoff intermolecular potential and an arbitrary boundary condition at the wall. For a small bounded domain (two walls closer than a mean free path) proof of the existence of a solution is relatively simple. In a half space the solution is proved to exist for sufficiently high frequency omega > omega sub o (omega sub o is comparable to the mean collision frequency). Asymptotic expressions show the disappearance of a conventional sound wave at high frequency. This is consistent with known results for a relaxation model of the Boltzmann equation and qualitative estimates for the actual Boltzmann equation based on the dominance of the continuous spectrum at high frequency. At a fixed arbitrary distance from the wall, the dominant high frequency disturbance consists of just those particles emitted by the wall, decreased by scattering, but without any compensating contribution from the creation term of the collision operator. (Author)

AD-633 991 **Field 20A, 13J**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
RADIATED SOUND FROM A CLAMPED CIRCULAR PLATE EXCITED IN THREE DIRECTIONS.
Research and development rept.,
by Forrest J. Agee Jr., and William J. Meggs. Jun 66, 43p MEL-181/66
Proj. S-F013-11-08,
Task 01352

Descriptors: (*Acoustics, Ship hulls), (*Sound, Propagation), Acoustic impedance, Mathematical models, Marine engineering.

An experimental and theoretical study of the sound radiated from a centrally driven clamped circular plate was performed to gain information about the acoustic transfer function of this model. This was a phase of a study of parameters which influence the radiated sound due to a vibration source mounted inside a ship hull. The relative acoustic importance of vibrational force and torque inputs was investigated for three principle directions: normal to the plate, parallel to the plate, and rotationally flexing the plate. The experimental results indicated that contributions from motion in the plane of the plate were negligible. At low frequencies, the normal input direction was dominant, but the rotational input became more important at higher frequencies (above 1000 cps for this model). The theoretical treatment yielded the velocity distribution over the plate for the modes excited by a normal drive and the near and distant radiated sound fields. The solutions were integrated numerically for points on the axis of the plate. The ratio of the axial far-field to near-field radiated sound was computed to permit deducing the far-field acoustic transfer function from near-field data. (Author)

N66-21773 **Field 20A**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
SATELLITE SITUATION REPORT. VOLUME 6, NO. 3.
15 Feb 66, 27p Rept. no. X-512-66-51, NASA-TM-X-57324
Prepared in cooperation with Norad and Smithsonian Astrophys. Obs.

Descriptors: *Apogee, *Inclination, *Perigee, *Satellite orbit, *Orbiting satellite.

AD-633 581 **See Field 17A**

AD-633 616 **See Field 20D**

AD-633 653 **See Field 20I**

AD-633 657 **See Field 8K**

AD-633 676 **See Field 20K**

AD-633 964 **See Field 20D**

AD-633 973 **See Field 17A**

AD-634 017 **See Field 19D**

20B. CRYSTALLOGRAPHY

AD-270 697 **Field 20B, 11F**
CFSTI Price: HC$2.60
Ship Structure Committee, NAS-NRC, Washington, D. C.
EFFECT OF SUBSTRUCTURE ON CLEAVAGE IN IRON CRYSTALS,
by W. F. Flanagan, B. L. Averbach, and Morris Cohen. 1962, 22p SSC-133, Progress rept. no. 5
Contracts NObs-78541, NObs-84321,
Proj. SR-136,
Task 2004
Prepared in cooperation with Washington Univ., Seattle and Massachusetts Inst. of Technology, Cambridge.

Descriptors: (*Iron, *Single crystals), Microstructure, Lattices, Deformation, Heat treatment, Density, Brittle materials, Transition temperature, Phase transitions, Fracture (Mechanics), X-ray spectroscopy, Strain gages, Tensile properties, Stresses, Plastic flow.

The influence of substructure on the cleavage transition temperature in iron single crystals was investigated. Substructure was introduced by prestraining up to 10% and annealing, with the dislocation density increasing correspondingly from an initial value of about 10 to the 7th power to about 10 to the 10th power per sq cm. The yield properties of the crystals with substructure were somewhat higher while the brittle transition temperature was raised about 40 C. Twinning preceded cleavage in these tests, and all the cleavage microcracks observed were associated with twins. The microcracks were located either along the twin/matrix interfaces or within the twins, but not in the matrix itself nor at intersecting twins. Cleavage appears to be initiated by the action of twinning, rather than by the role of twins as barriers to slip. (Author)

AD-633 600 **Field 20B, 11F**
CFSTI Prices: HC$2.00 MF$0.50
Franklin Inst. Research Labs., Philadelphia, Pa.
DEFORMATION STRUCTURES IN ZONE-MELTED MOLYBDENUM ABOVE ROOM TEMPERATURE.
Interim rept.,
by A. Lawley. Sep 65, 30p I-B2195-2
Contract Nonr-4434 (00)

Descriptors: (*Molybdenum, *Crystal lattice defects), Single crystals, Stresses, Strain (Mechanics), Deformation, Crystal substructure, Zone melting.

Stress-strain behavior of single crystal molybdenum oriented for slip on the (011) (111) slip system has been examined at 578K; the associated glide dislocation configurations have been characterized by thin film transmission electron microscopy. A high density of prismatic loops is observed elongated along (211). Few long segments of primary screw dislocation exist, but there are serrated, angular, and cusp-shaped segments of short length. The debris of dislocation loops has the same Burgers vector as the primary screw dislocations. Dislocation tangling is restricted to the immediate vicinity of inclusions or pinned grown-in dislocations. In comparison, the slip band structure in the range 4.2 - 300K is characterized by the presence of long primary screw dislocations of Burgers vector plus or minus a/2 (111). Jog for-

mation at 578K is most likely the result of thermally activated cross-slip. However, it is possible that the magnitude of the dislocation uncertainty perpendicular to the slip plane in molybdenum at this temperature is sufficient to provide job heights consistent with the width of the observed elongated prismatic loops. The work-hardening level is controlled by the extent of secondary slip, and by the recovery occurring through cross-slip. (Author)

AD-633 669 **Field 20B, 11F**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ELECTRICAL AND MAGNETIC PROPERTIES OF SINGLE CRYSTALS OF RARE EARTH TUNGSTEN BRONZES AND URANIUM TUNGSTEN BRONZES.
Master's thesis,
by Charles V. Collins. Mar 66, 84p GSP/PH/66-03

Descriptors: (*Bronze, *Single crystals), Rare earth compounds, Uranium alloys, Tungsten alloys, Electrical properties, Magnetic properties, X-ray diffraction analysis, Crystal growth.

Rare earth tungsten bronze single crystals have been prepared for the first time by the method of electrolysis. Sodium tungsten bronze single crystals with x ranging between .37 and .81 were also prepared. Powder samples of a new tungsten bronze, uranium tungsten bronze, have been synthesized by a thermal reaction of tungsten trioxide, uranium oxide, and tungsten. Magnetic measurements indicate that uranium is tetravalent in the tungsten bronze compound. All samples were investigated by x-ray diffraction methods. Conductivity measurements were made on all samples and the metallic nature of the cubic rare earth and uranium tungsten bronzes was established. (Author)

AD-633 722 **Field 20B, 11F**
CFSTI Prices: HC$6.00 MF$1.25
Case Inst. of Tech., Cleveland, Ohio.
MECHANICAL PROPERTIES OF TANTALUM SINGLE CRYSTALS,
by W. A. Spitzig, and T. E. Mitchell. 1965, 263p
Grant AF-AFOSR-829-65

Descriptors: (*Tantalum, *Single crystals), Mechanical properties, Hardening, Crystal lattice defects, Deformation, Electron microscopy, Strain (Mechanics), Stresses.

Three-stage hardening has been found to occur in tantalum single crystals deformed in tension over a limited range of orientations, temperatures and strain-rates. The orientation range is for crystals oriented favorably for single glide. The temperature range corresponds to T/Tm and equal to or about 0.10 to 0.18. The work-hardening rate in stage II is about G/600. The dislocation structure in tantalum single crystals exhibiting three-stage hardening has been investigated by transmission electron microscopy. In stage I tangles of dislocations containing many straight screw dislocations are seen lying parallel to the slip plane. In stage II an elongated cell structure develops with tangles of dislocations increasing in density and becoming linked together. Misorientations across cell boundaries become increasingly apparent with increasing deformation in stages II and III. A quantitative theory of work-hardening is presented for stage II in body-centered cubic metals which is an adaptation of a recent theory proposed by Hirsch. (Author)

AD-633 764 **Field 20B, 7D, 20L**
CFSTI Prices: HC$1.00 MF$0.50
Spinedi (Paolo), Rome (Italy).
RESEARCH INTO THE CHEMICAL BEHAVIOUR OF SURFACES OF SINGLE-, BI- AND TRI-CRYSTALS UNDER DIFFERENT EXPERIMENTAL CONDITIONS.
Quarterly technical status rept. no. 3, 1 Jan-31 Mar 66,
by Paolo Spinedi. 31 Mar 66, 10p
Contract DA-91-591-EUC-3593
See also AD-632 370.

Descriptors: (*Crystals, Chemical properties), (*Oxidation, Crystals), (*Zinc, Electrochemistry), (*Grain boundaries, Zinc), Germanium, Iron compounds, Ores (Metal sources, Surfaces, Ion bombardment, Single crystals, Etched crystals, Liquid metals, Italy.

Identifiers: Iron oxides.

Information is given about the results obtained, by the use of an emission microscope, in the field of oxidation studies and of controlled reduction processes, carried out both on organic nuclei (previously deposited from vapour phase on a suitable metallic substratum), and on hematite natural crystals. New results are summarized concerning the electrochemical behaviour of zinc tri-crystals under potentiostatically controlled conditions. A brief account is given of some preliminary tests regarding liquid metal penetration along the grain boundaries of a zinc tri-crystal substratum.

IS-1287 **Field 20B, 11B, 18J**
CFSTI Prices: HC$3.00 MF$0.75
Ames Lab., Iowa State Univ. of Science and Tech.
NUCLEATION AND CRYSTAL GROWTH FROM CERAMIC MELTS. SELECTED BIBLIOGRAPHY, 1947-1964,
by J. E. Burlingame, and M. F. Berard. Sep 65, 86p
Contract W-7405-eng-42

Descriptors: (*Crystal growth, Nucleation), (*Ceramic materials, Single crystals).

PB-170 549 **Field 20B, 11B, 7D**
CFSTI Prices: HC$5.60 MF$0.50
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE PAR DIFFRACTION DES RAYONS X DE GLUCINE IRRADIEE AUX NEUTRONS (X-Ray Diffraction Studies of Neutron Irradiated Beryllium Oxide),
by Bella Belbeoch, Janine Rodot, and Monique Roulliay. Apr 66, 56p CEA-R-2943
Text in French; Attached summary in English.

Descriptors: (*Beryllium compounds, Oxides), (*X-ray diffraction analysis, Beryllium compounds), Neutron reactions, Refractory materials, Anisotropy, Single crystals, Crystal lattice defects, France.

Identifiers: Beryllium oxides.

X-ray diagrams of neutron irradiated sintered BeO ($E > 1$ MeV) can be classified into 3 types depending on the value of the c/a ratio, independently of the characteristics of the sinters (hot pressed or cold pressed material, variable density and grain size, pure BeO or BeO with additions). The anisotropic expansion of the BeO lattice caused by irradiation depends not only on the dose of irradiation, but also on the intergranular stresses of the samples. The sintered samples which resist most satisfactorily to irradiation consist of cold pressed high density and small grain size material for which the c/a ratio varies little with increasing dosage. The single crystal diagrams show the same classification as the polycrystalline material in respect with the c/a ratio. In addition to the Bragg reflections, X-ray diffusions are observed; the distribution of the defects is no longer isotropic; a description is given in particular of the scattering which occurs when $1.625 < c/a < 1.645$. It appears that the defects start to congregate and cause pronounced distortion of the lattice. The defects are stabilized in the form of large aggregates only when a later irradiation stage is reached. (Author)

AD-633 672 **See Field 20L**

AD-633 710 **See Field 8G**

AD-633 715 **See Field 20L**

AD-634 032 **See Field 20L**

20C. ELECTRICITY AND MAGNETISM

AD-409 705 **Field 20C, 9A, 20G**
CFSTI Price: HC$2.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMPUTATION OF THE SPREADING OF AN ELECTRON BEAM UNDER ACCELERATION AND SPACE-CHARGE REPULSION,
by G. E. Vibrans. 18 Apr 63, 26p Technical rept. no. 308
Contract AF 19 (628)-500, ARPA Order-85

Descriptors: (*Electron beams, Scattering), (*Space charges, Diffusion), Electron optics, Differential equations, Acceleration, Velocity, Equations of motion.

The known differential equation, which describes the spreading of a circular electron beam in an accelerating field under space-charge repulsion, is derived in a simplified form so that the general solution can be precomputed. The solution is discussed and is given in a diagram. All auxiliary calculations are listed in order that the beam radius can be found for any set of initial conditions. Only the diagrams and a slide rule are needed. Another independent method of computation for the same purpose, which may be useful under special conditions, is also included.

AD-633 685 **Field 20C, 9A**
CFSTI Prices: HC$3.00 MF$0.75
Naval Research Lab., Washington, D. C.
ELECTRODYNAMICS OF A SUPERCONDUCTING PARALLEL PATH CIRCUIT.
Final rept.,
by Everett E. King. 9 May 65, 78p NRL-6410
Proj. RR-010-01-44-5601

Descriptors: (*Superconductors, Circuits), Superconductivity, Magnetic properties, Resistance (Electrical), Dynamics, Coils, Transients, Direct current.

In order to understand better the behavior of superconductors in electrical circuitry, a detailed study is presented of a circuit composed of two superconducting inductances connected in parallel. This circuit forms a closed superconducting path through which the magnetic flux will remain constant only if the resistance of the superconductor is zero. In this regard, an upper limit for the d. c. resistivity of a superconductor is found by two methods. The first method appears in the literature several times and consists of an attempt to detect the decay of a persistent current. The second method has not been reported previously and consists of an attempt to observe between the two branches a current distribution different from that which conserves the flux linkage. These methods differ in that, in the first method, the persistent current exists entirely within the superconductor; whereas, in the second method, the externally supplied current must both enter and leave the superconductor. The transient response of the circuit is investigated also. The flux linkage is verified to remain constant to within an experimental error of about 1% for current changes as short as about 1 microsecond.

AD-413 089 **See Field 20L**

AD-414 451 **See Field 9A**

AD-459 312 **See Field 20I**

AD-633 626 **See Field 20I**

AD-633 652 **See Field 20N**

AD-633 726 **See Field 20F**

AD-633 761 See Field 20J

AD-633 780 See Field 9B

AD-634 032 See Field 20L

AD-634 038 See Field 20N

AD-634 050 See Field 20F

AD-634 061 See Field 20L

AD-634 070 See Field 20N

20D. FLUID MECHANICS

AD-633 465 Field 20D
California Inst. of Tech., Pasadena.
STABILITY OF LAMINAR BOUNDARY LAYERS AND WAKESWAKES AT HYPERSONIC SPEEDS. PART I. STABILITY OF LAMINAR WAKES,
by Lester Lees, and Harris Gold. 1966, 31p Pub-619
Contract DA-31-124-ARO (D)-33
AROD 1600:77

Descriptors: (*Wake, Stability), (*Laminar boundary layer, *Hypersonic characteristics), Laminar flow, Compressible flow, Boundary layer transition.

The dynamical instability of compressible two-dimensional and axisymmetric laminar wakes is studied along lines similar to those developed by Batchelor and Gill for incompressible jets, and by Lees and Lin for compressible two-dimensional boundary layers. Neutral subsonic disturbances exist only when a generalized mean density-vorticity product has an extremum, and then only when the phase velocity corresponding to this location is subsonic relative to an observer fixed in the fluid. This condition is also sufficient (but not necessary) for the existence of amplified subsonic disturbances. The effect of a hot wake core is twofold: (1) as the wake core temperature excess increases, the range of relative Mach numbers over which unstable disturbances can exist also increases; (2) however, if the relative Mach number is less than the critical value, the amplification rates per wavelength of a hot wake are much lower than those of a cool wake. Stability calculations for typical cases are employed to give some insight into the phenomenon of transition to turbulence in hypersonic laminar wakes. The n = 1 (sinuous) helical mode apparently corresponds to some observations in wakes behind slender bodies of revolution at hypersonic speeds. (Author)

AD-633 580 Field 20D, 22A
CFSTI Prices: HC$7.70 MF$2.25
Lockheed Missiles and Space Co., Palo Alto, Calif.
FLUID MECHANICS AND HEAT TRANSFER UNDER LOW GRAVITY,
by H. Cohan, and M. Rogers. 1965, 470p
Proceedings of a Symposium held at Palo Alto, Calif. June 24-25, 1965.

Descriptors: (*Fluid mechanics, Symposia), (*Heat transfer, Symposia), Gravity, Weightlessness, Space flight, Containers, Gases, Liquids, Sloshing, Tanks (Containers).

Contents: Saturn V low-gravity fluid mechanics problems and their investigation by full-scale orbital experiment; An experimental investigation of the dynamic behavior of the liquid-vapor interface under adverse low-gravitational conditions; Inviscid fluid flow in an accelerating axisymmetric container; Some thermal aspects of a contained fluid in a reduced-gravity environment; Distribution of noncondensable gases in liquids under low-g conditions; The fluid mechanics of condensing mercury in a low-gravity environment; Dynamic response of liquids in partially-filled containers suddenly experiencing weightlessness; Low-gravity liquid reorientation; Interfacial stability of liquid layers on elastic surfaces; Sloshing of a liquid in a draining or filling tank under variable-g conditions; The effect of wall elasticity and surface tension on the forced oscillations of a liquid in a cylindrical container; Shape and stability of the liquid-gas interface in a rotating cylindrical tank at low g; Meniscus shape under reduced-gravity conditions; Liquid settling in large tanks; The Martin Company's low-g experimental facility; The application of hydrophilic and hydrophobic surfaces for phase separation in a low-g environment.

AD-633 616 Field 20D, 20A
CFSTI Prices: HC$1.00 MF$0.50
Houston Univ., Tex. Dept. of Electrical Engineering.
SCATTERING FROM A SINUSOIDALLY PERIODIC SURFACE IN MOTION,
by Y. J. Seto, and H. S. Hayre. 1966, 8p
Contract Nonr-4492 (02)

Descriptors: (*Rayleigh scattering, Surfaces), Doppler effect, Polarization, Field theory, Acoustics.

This work shows that in addition to doppler effect, there is considerably stronger polarization dependence of the scattered field by a moving sinusoidal surface as opposed to the stationary case. For the case of acoustic waves, a slowly moving surface contributes insignificantly to the amplitude to the reflection coefficient, but may appreciably affect its angular dependence. (Author)

AD-633 627 Field 20D, 12A
CFSTI Prices: HC$2.00 MF$0.50
Maryland Univ., College Park. Inst. for Fluid Dynamics and Applied Mathematics.
HEREDITARY DEPENDENCE IN DYNAMICS.
Technical note,
by G. Stephen Jones. Mar 66, 33p BN-442
Contract Nonr-595 (17), Grant NSF-GP-3666

Descriptors: (*Mathematical models, *Dynamics), Differential equations, Difference equations, Functional analysis.

AD-633 762 Field 20D, 20M
CFSTI Prices: HC$4.00 MF$1.00
North American Aviation, Inc., Columbus, Ohio. Engineering Dept.
AERODYNAMIC HEATING IN THE VICINITY OF SURFACE PROTUBERANCES.
Final rept.,
by Michael C. Fong. 30 Mar 66, 136p NA65H-891
Contract NOw-61-0719-t

Descriptors: (*Aerodynamic heating, Surfaces), Laminar flow, Flow separation, Heat transfer, Flat plate models, Mathematical models.

An analytical method based on the two-parameter momentum-integral concept has been developed for laminar supersonic flows over a two-dimensional protuberance. This method is applicable both to the case where the external pressure field is prescribed and to the 'free interaction' problem for which the mathematical solution for the local flow disturbance is not directly influenced by the downstream geometry of the disturbance source. By comparing with experimentally determined pressure and heat transfer data for a wide range of separated flow problems, it has been found that the theory is valid in regions up to and beyond the separation point. The analytical procedures can also be applied to separated flows on the plane of symmetry upstream of a cylindrical protuberance and over an unyawed axisymmetric body. An experimental program utilizing the DTMB hypersonic tunnel facility has been prepared for measuring surface pressure and heat transfer rates in the vicinity of cylindrical protuberances. Protuberance model design and fabrication, as well as preliminary tunnel check-outs have been completed. Development of semi-empirical procedures for predicting protuberance-induced heating effects and verification of the two-parameter analytical theory may be undertaken when quantitative test data are available. (Author)

AD-633 765 Field 20D, 21D, 13D
CFSTI Prices: HC$2.00 MF$0.50
California Inst. of Tech., Pasadena.
THE EFFECT OF WALL ELASTICITY AND SURFACE TENSION ON THE FORCED OSCILLATIONS OF A LIQUID IN A CYLINDRICAL CONTAINER,
by P. Tong, and Y. C. Fung. 1966, 40p
Symposium on Fluid Mechanics and Heat Transfer under Low Gravitational Conditions, 24-25 June 1965, Lockheed Research Labs., Palo Alto, Calif.

Descriptors: (*Fuel tanks, *Fluid mechanics), Sloshing, Elasticity, Surface tension, Containers.

The stability of a fluid contained in a circular cylindrical tank with a flat, flexible bottom under a periodic axial excitation is studied. A variational approach is formulated. An approximate solution results in a pair of coupled ordinary differential equations with periodic coefficients. A method of handling the stability of the solutions of such a system of equations is presented. Numerical results are discussed. (Author)

AD-633 766 Field 20D
CFSTI Prices: HC$1.00 MF$0.50
Martin Co., Denver, Colo.
LIQUID SETTLING IN LARGE TANKS,
by T. E. Bowman. 1966, 20p
Contract NAS8-11328
Symposium on Fluid Mechanics and Heat Transfer under low Gravitational Conditions, 24-25 Jun 1965, Lockheed Research Laboratories, Palo Alto, Calif.

Descriptors: (*Liquefied gases, Fluid dynamic properties), (*Tanks (Containers), Hydrogen), Separation, Stability, Fluid flow, Surface tension.

The results discussed showed that primary aspects of the settling flow can be validly scaled by using Bond number, at least within the range covered by the investigation. Liquid level in the test vessel was not found to have an effect on the initial settling flow. Secondary flow characteristics such as viscous effects are not scaled by the Bond number. The physical explanation of the fact that Bond number was found to describe primary aspects of the settling flow for a wide range of vessel sizes, acceleration levels, and test liquids rests on the discussion of Taylor instabilities. Basic characteristics of the settling flow observed in the experiments are in general the same characteristics that were predicted on the basis of the Taylor instability. Within this general class of flows, differences between various specific types of flow were shown by the experiments to depend on initial conditions at the interface. Since the interface is essentially static immediately following capsule release (or application of ullaging thrust, in the full-scale case), the conditions on which the initial flow behavior is based are determined by the ratio of inertial to surface tension forces, or Bond number. Thus the basic characteristics of the entire flow should depend on the initial Bond number, as was found experimentally. (Author)

AD-633 915 Field 20D
CFSTI Prices: HC$4.00 MF$1.00
Colorado State Univ., Fort Collins. Fluid Mechanics Program.
TURBULENT EDDIES IN BOUNDARY LAYERS ON SMOOTH AND ROUGH FLAT PLATE.
Technical rept.,
by Shamsuzzaman Chowdhury. Mar 66, 140p
CER65SC-EJP57
Grant DA-AMC-28-043-G20

Descriptors: (*Flat plate models, *Turbulent boundary layer), Roughness, Metal plates, Fluid mechanics, Experimental data, Correlation techniques.

This study represents one in a series of boundary layer investigations which are undertaken in order to obtain a definition of the roughness characteristics of a surface from the turbulence structure in the boundary layer near the surface. It is attempted to discuss the effect of the roughness in the structure of the turbulent eddies found near the boundary by comparing space correlations and spectra which were measured in the boundary layer on smooth and rough flat plates. The experimental investigations were made with a flat plate placed at a height of 2.0 ft. from the floor of a wind tunnel which had a 6 ft. x 6 ft. cross-section. The size of the plate used was 6 ft. x 3 ft. To obtain a rough surface condition, gravel which passed through a no. 7 sieve and are retained on a no. 8 sieve was glued to the surface of the aluminum plate. The density of the roughness material was 120 particles per square inch.

AD-633 949 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Dept of Aerospace Engineering and Applied Mechanics.
HYPERSONIC FLOW ALONG TWO INTERSECTING PLANES,
by Robert J. Cresci. Mar 66, 36p PIBAL-895
Contract AF 49 (638)-1391,
Proj. AF-9781,
Task 978101
AFOSR 66-0500

Descriptors: (*Hypersonic flow, Experimental data), Configurations, Model tests, Flat plate models.

Identifiers: Corner flow.

The present paper deals with an experimental study of the viscous-inviscid interaction occuring in a corner region under hypersonic, low density, free stream conditions. The tests were conducted in the Mach 11.8 hypersonic tunnel at PIBAL over a range of free stream Reynolds numbers between 0.15 x 10 to the 6th and 0.50 x 10 to the 6th/ft. The model consists of two sharp edged plates mounted at an angle of 90 degrees with respect to each other and with normal leading edges. Data obtained include surface measurements of pressure and heat transfer for values of the interaction parameter between 1.0 and 20. The entire corner region is surveyed at a value of 2.5 and measurements of total temperature, pitot, and static pressure are obtained. The results indicate that the static pressure in the region of intersection of the shock layers is as much as twice that of the local two dimensional value. The local heat rates in this region are also considerably larger than their two dimensional counterparts. (Author)

AD-633 950 **Field 20D**
CFSTI Prices: HC$5.00 MF$1.00
Massachusetts Inst. of Tech., Cambridge. Aerophysics Lab.
LAMINAR MIXING OF TWO STREAMS IN A PRESSURE GRADIENT.
Technical rept.,
by Robert A. Greenberg. Feb 66, 158p TR-117
Contract AF 49 (638)-1621, Grant AF-AFOSR-62-407,
Projs. AF-9781, MIT-DSR-9195,
Task 978102
AFOSR 66-0580
Grant AF-AFOSR-641-64.

Descriptors: (*Jet mixing flow, *Laminar boundary layer), Pressure, Viscosity, Approximation (Mathematics), Stagnation point, Chemical reactions.

An analytical study was made of the laminar mixing between a gas stream ejected from the nose of a body and a shocked free stream. The physical problem was broken down into three regions of flow, one involving free mixing in the vicinity of the stagnation point, another in which the mixing layer interacts with the body surface, and a third in which viscous effects have diffused throughout the ejected flow. Only the first region was treated in detail. An approximate analytic method was developed to solve the mixing layer flow. The method allows nonsimilar mixing, variable fluid properties, and coupling between the governing equations. A comparison between results of this approximate method and exact numerical solutions for both similar and nonsimilar flows indicates very good agreement. The results for the velocity, shear, enthalpy, and enthalpy gradient at the point where the stream function is zero differ by about 3% in most cases, by 10% in the worst cases. The approximate method also predicts the variation of the flow quantities across the mixing layer very accurately.

AD-633 956 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
STRONGLY RADIATING HYPERSONIC FLOW OVER A SPHERE: AN ASYMPTOTIC SKETCH,
by Ira M. Cohen. May 66, 30p Nonr-562 (35)/15
Contract Nonr-562 (35)
Proj. NR-061-132

Descriptors: (*Hypersonic flow, *Spheres), Blunt bodies, Hypersonic characteristics.

AD-633 958 **Field 20D, 12A**
CFSTI Prices: HC$3.00 MF$0.75
Aerospace Corp., San Bernardino, Calif.
NUMERICAL CALCULATIONS OF ARBITRARY MULTIDIMENSIONAL AND UNSTEADY FLOWS BY THE METHOD OF CHARACTERISTICS.
Technical documentary rept.,
by Harry Sauerwein. May 66, 66p TR-669 (S6815-71)-2
Contract AF 04 (695)-669
BSD TR-66-169

Descriptors: (*Numerical methods + procedures, *Fluid flow), Programming (Computers), Partial differential equations, Shock waves.

Identifiers: Method of characteristics.

The analytic and numerical procedures necessary to write a general method of characteristics computer code are presented. The theory of characteristics is applied to the partial differential equations of an inviscid fluid, the geometry of the characteristics is determined, a procedure for finite-differencing the compatibility equations is developed and the stability and convergence of the procedure is analyzed. The details of the finite difference network and of a successful organization of the network to calculate complete flow fields are presented. The flow between a detached shock wave and the surface of a two-dimensional body in unsteady motion has been calculated. The results of several calculations of specific body motions are presented in the form of velocity vector plots and contours of constant values of the dependent variables at various times during the calculation. From the results it is concluded that practical calculations of multidimensional unsteady flows can be accomplished with an extensive coding effort and a reasonable amount of computer time. Ways for improving the accuracy and the general applicability of the method of characteristics have been discovered and these help to increase the general utility of the method. (Author)

AD-633 959 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
TURBULENT FLOW OF DILUTE POLYMER SOLUTIONS. STUDIES IN COUETTE FLOW.
Doctoral thesis,
by Tae-Sup Lee. May 66, 47p
Contract Nonr-3963 (10)

Descriptors: (*Polymers, Turbulence), (*Drag, Reduction), Couette flow, Relaxation time, Shear stresses, Molecular weight, Additives.

The purpose of the thesis was to investigate the phenomenon of drastic reduction of turbulent drag (friction stress) in a micromolecular liquid by the addition of soluble high-polymer substances.

AD-633 961 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
ON THE MOTION OF AN INFINITE PLATE IN A VISCOUS COMPRESSIBLE FLUID WITH SMALL RADIATIVE HEAT TRANSFER,
by H. C. Kung. Apr 66, 48p Nonr-562 (35)/14
Contract Nonr-562 (35)
Proj. NR-061-132

Descriptors: (*Flat plate models, Motion), (*Fluid mechanics, Flat plate models), Heat transfer, Compressible flow.

The flow of a viscous, compressible, heat conducting fluid near an impulsively started infinite flat plate is considered in the limiting case of a weakly radiating gray gas. The plate is thermally insulated. The time is restricted to be of the order of the ratio of photon mean free path to plate velocity, and the Reynolds number based on photon mean free path must be large compared with M6 (M is Mach number of the plate). Then the flow field is separated into two asymptotically significant regions: a viscous boundary layer and an inviscid outer region. The smallness of the radiation-convection ratio enables us to compute the radiation-perturbed flow field as an iteration on the radiationless solution. For an optically thick gas (optically finite boundary layer), the author finds that the effect of thermal radiation is limited to the boundary layer. Radiative transport lowers the temperature of the fluid close to the plate and raises the temperature of the fluid away from the plate. For an optically finite gas (optically thin boundary layer), the temperature of the fluid very close to the plate is substantially lowered, the fluid in the rest of the boundary layer is heated by radiation, and there are waves propagating in the outer region due to the radiative heat flux from the boundary layer. (Author)

AD-633 964 **Field 20D, 20A, 20K**
CFSTI Prices: HC$2.00 MF$0.50
Navy Mine Defense Lab., Panama City, Fla.
THE THEORETICAL PRESSURE WAVEFORM IN A LAYERED MEDIUM DUE TO A SERIES OF IMPULSES.
Interim rept.,
by Alan S. Victory, and Edward G. McLeroy.
May 66, 31p i-99
Proj. SR-011-01-01,
Task 0401-1

Descriptors: (*Mechanical waves, Propagation), (*Underwater sound, Propagation), Model tests, Air, Water, Glass, Aluminum, Pressure.

The extension made by Spitznogle to include a complex air-fluid two-layer elastic solid system in Strick's theory of the propagation of elastic waves from an impulsive source along a fluid-solid interfaces has been further expanded. In the previous work the source-function considered was a single impulse. This has been replaced (in the present work) by a source-function which is a series of such impulses. Theoretical waveforms are computed for an air-water-glass-aluminum model and various impulsive source-functions ranging from the single impulse to a sequence of impulese of various magnitudes and spacings in time. (Author)

AD-633 971 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
RAND Corp., Santa Monica, Calif.

NEWTONIAN SNOWPLOW THEORY OF OSCILLATING AIRFOILS,
by J. Aroesty, A. F. Charwat, S. Y. Chen, and J. D. Cole. May 66, 20p RM-4415-ARPA
Contract SD-79, ARPA order-189-1

Descriptors: (*Airfoils, Model theory), Oscillation, Pressure, Dynamics, Hypersonic characteristics.

Identifiers: Newtonian theory.

Unsteady forces acting on two-dimensional oscillating airfoils are calculated by Newtonian snowplow theory. A pressure formula which is valid for linear and nonlinear oscillations is obtained, and comparisons are made with the exact, linearized gasdynamic theory for a hypersonic slender wedge. These comparisons indicate that Newtonian theory is not very accurate for the calculation of unsteady stability derivatives and seems to be inferior to estimates made using simple impact theory. (Author)

AD-633 978 **Field 20D**
CFSTI Prices: HC$4.00 MF$0.75
North American Aviation, Inc., Anaheim, Calif. Ocean Systems Operations.
A NEW METHOD FOR PREDICTION OF STABILITY OF LAMINAR BOUNDARY LAYERS.
Interim rept.,
by John R. Radbill, and Edward R. van Driest.
Feb 66, 106p C6-1019/020
Contract AF 49 (638)-1442
Proj. AF-9781
Task 978102
AFOSR 66-0702

Descriptors: (*Laminar boundary layer, Stability), Mathematical prediction, Boundary layer transition.

Identifiers: Quasilinearization.

A new method for predicting the stability of laminar boundary layers is described. The quasilinearization method is used to compute eigenfunctions and eigenvalues for the complete orr-summerfeld equation. Remarkable agreement is found between the computed shape of the Tollmien-Schlichting wave and the data of Schubauer and Skramstad. A computed neutral stability curve shows better agreement with the data of Schubauer than do the theoretical curves of Schlichting or Shen. The method is important because it can be used to study nonlinear effects which are believed to lead to turbulence. (Author)

AD-634 036 **Field 20D, 20K**
CFSTI Prices: HC$2.00 MF$0.50
J. G. Engineering Research Associates, Baltimore, Md.
ORDER OF MAGNITUDE OF RADIATION FROM TURBULENT FLOW AND TURBULENCE EXCITED STRUCTURAL VIBRATION.
Technical rept.,
by Joshua E. Greenspon. Dec 65, 27p TR-8
Contract 167-28-644X

Descriptors: (*Turbulence, *Vibration), (*Structures, Vibration), Mechanical waves, Statistical functions, Cylindrical bodies.

Expressions are derived for the cross spectral density of the far field pressure resulting from the vibration of an elastic surface excited by turbulence and from a rigid surface over which there is turbulent flow. The plate problem is worked out in detail and it is shown that for frequencies of the order of the resonance of the lowest plate modes the radiation is due primarily to elastic vibration, whereas at high frequencies corresponding to higher resonant modes in the plate the turbulent flow alone can be responsible for part of the radiation. The basic formulas are also derived for the cylinder. (Author)

AD-634 051 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Politenico di Torino (Italy). Istituto di Meccanica Applicata.
RESEARCHES ON RAREFIELD GAS DYNAMICS, HYPERSONIC FLOW AND TURBULENT FLOW PERFORMED AT THE INSTITUTE OF APPLIED MECHANICS, POLITENICO DI TORINO, ITALY.
Final scientific rept.,
by Carlo Ferrari. Jan 66, 10p
Grant AF-EOAR-98-63
AFOSR 66-0899

Descriptors: (*Scientific research, *Superaerodynamics), (*Hypersonic flow, Theory), (*Turbulence, Experimental data), Shock tubes, Molecular beams, Shock waves, Laminar boundary layer, Italy.

(1) Experimental researches with the shock tube; (2) Experimental study on the influence of different pressure distribution laws on turbulent flow; (3) Theoretical study on the interaction between a rigid wall and a molecular beam or a free molecule flow; (4) Theoretical researches on low density hypersonic flow; (5) Theoretical study of shock wave structure; and (6) Theoretical study on incompressible laminar boundary layer. (Author)

N66-21699 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
ANALYTICAL METHOD FOR DETERMINING FLOTATION STABILITY CHARACTERISTICS OF A RIGHT-CIRCULAR-CONIC FRUSTUM,
by J. L. Dillon, J. M. Willman, J. F. Newcomb, and R. L. Wright. Apr 66, 37p NASA-TN-D-3310

Descriptors: *Circular cone, *Flow stability, *Functional analysis, *Flotation system.

N66-21772 **Field 20D**
CFSTI Prices: HC$2.00 MF$0.50
Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering.
CONTINUUM FEEDBACK CONTROL OF A RAYLEIGH-TAYLOR TYPE INSTABILITY,
by J. R. Melcher, and E. P. Warren. 1965, 49p
Grant NsG-368
NASA CR-71406

Descriptors: *Electrohydrodynamics, *Feedback control system, *Continuum, *Taylor instability.

N66-21779 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Scientific Research Labs.
THE APPLICATION OF ONE-DIMENSIONAL ANALYSIS TO THRUST AUGMENTATION FOR THERMALLY PERFECT BUT CALORICALLY IMPERFECT GASES,
by F. W. Geiger. Sep 63, 23p R-69
Contract NAS8-5289
NASA CR-71540

Descriptors: *Rocket thrust, *Simultaneous linear equation, *Thrust augmentation.

N66-22264 **Field 20D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
AN EXPERIMENTAL INVESTIGATION OF THE DYNAMIC BEHAVIOR OF THE LIQUID-VAPOR INTERFACE UNDER ADVERSE LOW-GRAVITATIONAL CONDITIONS,
by W. J. Masica, and J. A. Salzman. 1965, 15p
NASA-TM-X-52095

Descriptors: *Acceleration, *Hydrodynamics, 8interface stability, *Leading edge, *Liquid-vapor interface.

N66-22266 **Field 20D**
CFSTI Prices: HC$6.00 MF$1.50
TRW, Inc., Cleveland, Ohio. Accesories Div.
THREE-DIMENSIONAL ANALYSIS OF INDUCER FLUID FLOW,
by H. B. Bosch, and P. Cooper. 11 Feb 66, 245p
TRW-ER-6673A
Contract NAS3-2573
NASA CR-54836

Descriptors: *Induced fluid flow, *Inducer, *Motion equation, *Three-dimensional flow.

AD-633 584 **See Field 4B**

AD-633 612 **See Field 8J**

AD-633 635 **See Field 8J**

AD-633 656 **See Field 14B**

AD-633 675 **See Field 20A**

AD-633 677 **See Field 20M**

AD-633 689 **See Field 13G**

AD-633 699 **See Field 11H**

AD-633 713 **See Field 20M**

AD-633 831 **See Field 20A**

AD-633 861 **See Field 12B**

AD-633 948 **See Field 16D**

AD-633 974 **See Field 20I**

AD-633 979 **See Field 20A**

AD-634 017 **See Field 19D**

AD-634 119 **See Field 8C**

LA-3450 **See Field 19D**

20E. MASERS AND LASERS

AD-633 462 **Field 20E**
Dunham Lab., Yale Univ., New Haven, Conn.
SPONTANEOUS-EMISSION LINE SHAPE OF ION LASER TRANSITIONS,
by W. R. Bennett Jr., E. A. Ballik, and G. N. Mercer. 7 Mar 66, 3p
Contract DA-31-124-ARO (D)-124
AROD 4313:10

Descriptors: (*Lasers, *Line spectrum), (*Electron transitions, Lasers), Emissivity, Ions, Helium group gases, Argon, Scattering, Doppler effect, Approximation (Mathematics).

A classical derivation is given of the actual line shape to be expected from an accelerating, radiating ion and evaluate the errors associated with a Lorentzian approximation to this shape. Experimental results are also presented on representative ion laser transitions in argon for which accurate radiative lifetime data are available. These results show that the Lorentzian approximation is extremely good for typical conditions in the Ar (+) laser, due largely to very important nonradiative sources of phase interruption. The most plausible source of this additional line broadening consists of small-angle Coulomb scattering in ion-ion collisions.

AD-633 624 **Field 20E, 20J, 20F**
CFSTI Prices: HC$1.00 MF$0.50
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
DETERMINATION OF THE LOSS PARAMETERS OF A RUBY QUANTUM GENERATOR,
by B. I. Stepanov, A. N. Rubinov, and S. A. Mikhnov. 16 Mar 66, 11p TG-230-T468
Contract NOw-62-0604-c
TT 66-61390

Trans. of Akademiya Navuk BSSR, Minsk. Doklady, v9 n6 p367-71 1965.

Descriptors: (*Lasers, *Ruby), Quantum mechanics, Light, Attenuation, Algorithms, Optics, USSR.

Experimental methods for determining the basic parameters characterizing radiation losses in a ruby laser in a resonator with plane mirrors are outlined, using theoretical concepts developed by the authors in earlier papers. The method is based on determination of the scattering coefficient by measurement of energy level populations during generation. The population of the metastable level, studied with the aid of log (T/To) = cn2/n (T and To are transmittances with and without pumping, resp.), indicates that saturation occurs somewhat later than the onset of generation and is independent of the pumping power. The variation in population is attributed to crystal inhomogeneity. Mathematical formulas are given for determining the loss relative to the population and to the transmittance efficiency of the noise radiated by the ruby surface. (Author)

AD-633 703 **Field 20E, 14B**
CFSTI Prices: HC$4.00 MF$0.75
Belfer Graduate School of Science, Yeshiva Univ., New York.
LASER PHASOGRAPHY OF JETS, SHOCKS AND PLASMAS,
by Herman M. Presby. 1 Apr 66, 114p Scientific-1
Contract AF 19 (628)-2399,
Proj. AF-8608,
Task 860803
AFCRL 66-299

Descriptors: (*Lasers, Optical images), (*Jets, Test methods), (*Shock waves, Test methods), (*Plasma medium, Test methods), Diffraction, Interferometers, Refractive index.

Identifiers: Laser phasography, Laser phase macroscope.

The phase-contrast microscope of Zernike may be scaled in size and combined with 'giant pulse' ruby-laser illumination to make possible the observation of macroscopic moving tenuous objects, such as jets, shock waves and plasmas. The resulting instrument, referred to as the Laser Phase Macroscope (L.P.M.), has performance similar to that of an optical interferometer operated in the single-fringe mode. The operation of the phase macroscope is treated theoretically, first heuristically and then by diffraction integrals. Conditions for optimum imaging are derived. The 'phase plate' of Zernike is modified for use with focused laser illumination, and parameters for optimum imaging are given. Quite different mirrors are required for the full range of interesting plasmas accessible to the L.P.M. The experimental model is described. Phasograms of weak and strong shocks in air and argon down to .5 mm Hg pressure are shown. Rayleigh-Taylor instability behind the shock is observed. Gas jets of various refractivities are also used as test objects. Phasograms of vacuum sparks producing jets of ablated electrode material are shown. Many objects studied are invisible to schlieren photography using the same illumination and optics. (Author)

AD-633 733 **Field 20E**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
MEASUREMENT OF THE EXCITED STATE ABSORPTION CROSS SECTION IN RUBY AT 6943A AND 300K.
Master's thesis,
by Gerald J. Robertello. Mar 66, 98p GSP/PH/66-17

Descriptors: (*Lasers, Absorption), (*Ruby, Absorption), (*Chromium, Atomic energy levels), Pumping (Optical), Probability, Excitation, Scattering.

The excited state absorption cross section from the metastable state in ruby at the ruby laser wavelength and at 300K was experimentally determined. An indirect method was used, which involved the measurement of the times to laser threshold on four high quality ruby rods. A second experiment was then performed to measure the chromium ion population remaining in the ground state at each of these times. The ground state population was obtained by measuring the increase in intensity of 4100A probe light transmitted through the pumped ruby sample. An upper limit on the value for the cross section was obtained which is in agreement with that obtained by Kiang et.al. of 0.3 x 10 to the -20th power sq. cm. However, the conclusion was reached that thermally induced scattering had a small influencing effect, which reduced the final result to an average value of 0.17 plus or minus .06 x 10 to the -20th power sq. cm for the four ruby samples. (Author)

AD-633 839 **Field 20E, 20F**
CFSTI Prices: HC$3.00 MF$0.75
General Precision, Inc., Pleasantville, N. Y. Aerospace Group.
PUMPED TRANSFORMER LASERS.
Technical summary rept. no. 3, 1 Nov 65-1 May 66,
by C. B. Ellis, J. H. Simpson, D. S. Bayley, E. C. Eberlin and I. A. Greenwood. 25 May 66, 84p GPL-A-31-3
Contract Nonr-4718 (00), ARPA Order-306
Rept. on proj. defender. See also AD-624 481.

Descriptors: (*Lasers, Pumping (Optical)), Cesium, Vapors, Neodymium, Glass, Light, Fluorescence, Molecular properties, Transport properties, Absorption spectrum, Infrared radiation, Alkali metals, Band theory of solids, Transition temperature, Vapor pressure.

Identifiers: Transformer lasers, Defender project.

Both experimentation and analysis are underway on the possible use of cesium vapor for a transformer laser to be optically pumped by a battery of Nd glass lasers. A number of important unknown parameters of the Cs2 molecule have now been estimated, as a result of a detailed survey of existing data on the other alkali metal molecules. Experimentally, the absorption spectrum of saturated cesium vapor, contained in specially resistant glass at over 400C, has been explored throughout the 1 micron region at a dispersion of 21A/mm. The fluorescent emission of the vapor in this region has also been studied, under irradiation with about 80 watts/sqcm of 1.06micron Nd glass laser light. It seems reasonably clear that Cs2 molecules which absorb Nd light are actually raised to the lower vibrational levels of the Cs2.A electronic state, as planned. A bleaching of the Cs2 absorption transitions at 1.06micron upon pumping with one Nd glass laser indicates some likelihood that around 50% of the Cs2 molecules irradiated are being maintained in this excited state throughout a millisecond pulse. Fluorescence at wavelengths other than the pumping wavelength indicates the presence of energy-exchanging molecular collisions, of the general type needed for achieving a high power transformer laser cycle. (Author)

N66-21223 **Field 20E**
CFSTI Prices: HC$2.00 MF$0.50
HY-CAL Engineering, Santa Fe Springs, Calif.
LOW LEVEL GAS PURGED RADIOMETER MODEL NO. R8100A, PHASE II.
Final rept.,
by B. Rappaport. Nov 65, 28p
Contract NAS8-5490
NASA CR-71029

Descriptors: *Radiation measurement, *Measuring apparatus, *Radiometer.

N66-21698 **Field 20E**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
HYDROGEN MASER FREQUENCY COMPARISON WITH A CESIUM BEAM STANDARD,
by E. H. Johnson, and T. E. McGunigal. Apr 66, 15p NASA-TN-D-3292

Descriptors: *Beam current, *Cesium diode, *Frequency standard, *Hydrogen, *Maser output.

N66-22191 **Field 20E**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
TRACKING OF THE BEACON-EXPLORER SATELLITES WITH LASER BEAMS,
by H. H. Plotkin. 1965, 4p NASA-TM-X-56631

Descriptors: *Explorer satellite, *Photographic tracking, *Ruby laser, *Satellite tracking, *Optical tracking.

AD-413 089 **See Field 20L**

AD-633 554 **See Field 7E**

AD-633 634 **See Field 17I**

AD-633 954 **See Field 20F**

20F. OPTICS

AD-633 726 **Field 20F, 20C**
CFSTI Prices: HC$6.00 MF$1.25
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
RADIATION AND DIFFRACTION OF ELECTROMAGNETIC FIELDS IN ANISOTROPIC MEDIA.
Interim research rept.,
by Shalom Rosenbaum. 25 Feb 66, 215p PIB-MRI-1320-66
Contract AF 19 (628)-2357,
Proj. AF-5635,
Task 563501
AFCRL 66-255

Descriptors: (*Electromagnetic fields, *Diffraction), (*Electromagnetic waves, Field theory), Optics, Boundary value problems, Dielectrics.

This work deals with the radiation from two-dimensional time-harmonic source distributions embedded in a transversely unbounded region filled with a uniaxially anisotropic medium; the optic axis is permitted to be inclined at an arbitrary angle with respect to the z-direction of stratification. The problem incorporates non-reciprocal effects with respect to the z-axis (lack of reflection symmetry) as well as mode coupling at planar discontinuities and in the source region. Three types of discontinuities are considered: (a) perfectly conducting infinite plane, (b) a dielectric interface, (c) a perfectly conducting half plane. A guided mode technique is employed for the rigorous analysis of the boundary value problems, and special attention is paid subsequently to the asymptotic (short wavelength) limit which enables one to extract from the exact results invariant, ray-optical forms. Since the range of validity of the latter is broader than the special class of configurations from which they are derived, an extensive and direct use of ray techniques is suggested in more general anisotropic environments.

AD-633 954 **Field 20F, 20E**
CFSTI Prices: HC$3.00 MF$0.75
New Mexico State Univ., University Park. Research Center.
RESONANCE ABSORPTION OF ALPHA-POLARIZED COHERENT RADIATION BY PINK RUBY.

Technical rept.,
by R. C. Mitchell. May 66, 90p TR-4
Contract Nonr-3531 (04)

Descriptors: (*Light, Resonance absorption), (*Resonance absorption, *Ruby), Absorption spectrum, Lasers, Polarization, Optics, Optical instruments.

Identifiers: Coherent radiation, Alpha-polarization.

The R sub 1 absorption doublet in pink ruby has been studied near 90K, using alpha-polarized incident radiation with both coherent and incoherent sources. A 2-inch ruby laser was used as the coherent source. Frequency scanning was accomplished by varying the relative temperatures of source and sample. Incoherent light measurements were made with a one-meter Ebert spectrometer using a zirconium-arc source. Careful measurements were made of the wavelength separation of the R sub 1 (1/2) and R sub 1 (3/2) components, in the laser source, as well as the separation of the longitudinal modes in each component. The component spacing was found to be 0.3829 plus or minus .0004/cm and the mode separation was 0.0397/cm. The maximum values of absorption coefficient, using white light, were 10.7/cm for R sub 1 (3/2) and 8.8/cm for R sub 1 (1/2). Absorption coefficients corresponding to coincidence of the laser output with the centers of the corresponding lines in the sample varied between 9 and 3/cm depending on the intensity and degree of plane-polarization of the beam. (Author)

AD-634 013 **Field 20F**
CFSTI Prices: HC$1.00 MF$0.50
University of Southern California, Los Angeles. Dept. of Electrical Engineering.
RESEARCH IN OPTICAL COHERENCE.
Final rept.,
by Robert S. Macmillan, Gregory O. Young, James D. Arnett, and William K. Pratt. Dec 65, 20p
USCEE-168
Grant AF-AFOSR-188-65
Proj. AF-9768
Task 976802
AFOSR 66-0917

Descriptors: (*Optics, State-of-the-art reviews), Light communication systems, Information theory, Bibliographies.

Identifiers: Optical coherence.

Contents: Coherence Studies, Functional Transformations, Optical Polarization Modulation, A Test for Ergodicity for a Certain Class of Random Processes, Lens System Optimization, Bibliography of publications.

AD-634 050 **Field 20F, 20L, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Maryland Univ., College Park. Dept. of Physics and Astronomy.
FARADAY EFFECT IN MAGNETIZED SOLIDS.
Technical rept.,
by Edward A. Stern. May 65, 9p TR-461
Contract SD-101

Descriptors: (*Magneto-optic effect, *Solid state physics), Electromagnetism, Solids.

N66-22233 **Field 20F**
CFSTI Prices: HC$4.00 MF$1.00
Rochester Univ., N. Y.
ULTRAVIOLET INTERFERENCE FILTERS.
Master's thesis,
by V. R. Costich. 1965, 140p
NASA CR-70638

Descriptors: *Band pass filter, *Metal film, *Thin film, *Ultraviolet filter.

N66-22236 **Field 20F**
CFSTI Prices: HC$2.00 MF$0.50
Naval Research Lab., Washington, D. C. E. O. Hulburt Center for Space Research.
ON ERRORS IN USING THE REFLECTANCE VS ANGLE OF INCIDENCE METHOD FOR MEASURING OPTICAL CONSTANTS,
by W. R. Hunter. 8 Mar 65, 28p Rept. no. 7140-PRR-4/65
NASA CR-63954

Descriptors: *Attenuation coefficient, *Optical reflectivity, *Error, *Incidence, *Refractive index.

AD-411 384 **See Field 17H**

AD-423 017 **See Field 14B**

AD-437 791 **See Field 17H**

AD-633 539 **See Field 8L**

AD-633 554 **See Field 7E**

AD-633 624 **See Field 20E**

AD-633 634 **See Field 17I**

AD-633 645 **See Field 20L**

AD-633 646 **See Field 20I**

AD-633 780 **See Field 9B**

AD-633 839 **See Field 20E**

AD-634 034 **See Field 20L**

AD-634 035 **See Field 20L**

AD-634 070 **See Field 20N**

PB-169 661 **See Field 20G**

20G. PARTICLE ACCELERATORS

BNL-948 **Field 20G, 18K, 20H**
CFSTI Prices: HC$16.14 MF$5.00
Brookhaven National Lab., Upton, N. Y.
PROCEEDINGS OF THE SUMMER STUDY GROUP ON THE PHYSICS OF THE EMPEROR TANDEM VAN DE GRAAFF REGION, JUNE 21-JULY 16, 1965. VOLUME 1-3,
16 Jul 65, 1270p
Contract AT-30-2-GEN-16
Sold only in a set.

Descriptors: (*Electroslatice accelerators, Nuclear energy levels), (*Nuclear spectroscopy, Nuclear scattering).

NYO-72-28 **Field 20G, 20H**
CFSTI Prices: HC$5.00 MF$1.00
Columbia Univ., New York. Dept. of Physics.
PEGRAM NUCLEAR PHYSICS LABORATORIES.
Progress rept., Jun 64-Jun 65.
Feb 66, 164p
Contract AT (30-1)-GEN-72

Descriptors: (*Cyclotrons, Neutron cross sections), (*Charged particles, Nuclear reactions).

PB-169 661 **Field 20G, 14B, 20F**
CFSTI Prices: HC$3.60 MF$0.50
Laboratoire de l'Accelerateur Lineaire, Universite de Paris, Orsay (France).
AN APPLICATION OF FERMAT PRINCIPLE TO MAGNETIC SPECTROMETERS,
by Paul Bounin. Jan 66, 34p LAL-1151

Descriptors: (*Spectrum analyzers, Theory), (*Magnetic fields, Spectrum analyzers), (*Particle accelerator components, Spectrum analyzers), Optical phenomena, Magnets, Charged particles, Particle trajectories, France.

Identifiers: Magnetic spectrographs.

The well-known Fermat principle applied to corpuscular optics is reviewed. It is then applied to the particular case of magnetic spectrometers with a symmetry plane. As a consequence a rapid method is given to derive magnets with some specific aberrations cancelled. For examples, two previously known types of spectrometers are taken, but others may be derived by that method. (Author)

AD-409 705 **See Field 20C**

20H. PARTICLE PHYSICS

AD-633 731 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A STUDY OF THE S36 (p, GAMMA) Cl37 REACTION WITH BOMBARDING ENERGIES IN THE 790-KEV TO 1820-KEV RANGE.
Master's thesis,
by Jerry Joseph Perrizo. Feb 66, 65p GSP/PHYS/66-16

Descriptors: (*Sulfur, Proton Bombardment), (*Proton reactions, Gamma emission), (*Chlorine, *Nuclear energy levels), Particle accelerator targets, Cadmium compounds, Sulfides, Nuclear resonance, Gamma-ray spectra.

A search for resonances in the S36 (p, gamma-ray) Cl37 reaction was conducted using protons with energies in the 790-keV to 1820-keV range. Approximately 80 previously-unreported resonances were found in the energy region studied. The observed widths appear to be due to target thickness and instrumental effects. The intrinsic strengths, obtained by normalizing the relative strength of each S36 resonance to that of the 1214-keV resonance in the S34 (p, gamma-ray) Cl35 reaction, ranged from 0.02 eV to 1.16 eV. Preliminary analysis of data obtained from gamma-ray spectra has shown evidence for possible new low-lying levels in Cl37 at 4.3 and 5.4 MeV. (Author)

AD-633 837 **Field 20H, 7D**
CFSTI Prices: HC$2.00 MF$0.50
Brandeis Univ., Waltham, Mass. Dept. of Chemistry.
TIME-SMOOTHED ASPECTS OF RATE AND CROSS-SECTION MEASUREMENTS.
Technical rept.,
by Sidney Golden, and Ronald H. Felton. 15 May 66, 28p TR-17
Contract Nonr-1677 (01),
Proj. NR-051-362

Descriptors: (*Quantum mechanics, *N-body problem), Scattering, Numerical analysis, Probability.

The measurement aspects of experiments designed to yield information about rates at which certain processes occur in a system, as well as their relevant cross-sections, are discussed. As a closer approximation to experimental quantities, their time-smoothed theoretical counterparts are dealt with. The asymptotic behavior of these quantities, as the interval of time-smoothing becomes indefinitely large, are examined. In the long-term time averaged sense, it is shown that cross-sections computed from transition probabilities or rates of change of transition probability yield equivalent results in the limit of the system approaching a zero value of its density. The equivalence of the cross-section based upon a stationary state formalism is also established. The formal equivalence holds for many-particle systems. (Author)

N66-21778 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., San Diego, La Jolla. Dept. of Physics.

RADIO ELECTRONS AND MAGNETIC FIELDS IN THE GALACTIC HALO,
by J. E. Felten. 8 Feb 66, 16p
Contract AF 49 (638)-1527, Grant NsG-357
NASA CR-71547
Prepared in part by Cornell Univ., Ithaca, N. Y.

Descriptors: *Electron density, *Astrophysics, *Galactic radiation.

N66-22178 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
POSSIBLE NEUTRALITY OF COSMIC RADIATION,
by K. A. Brunstein, and T. L. Cline. Nov 65, 12p
Rept. nos. NASA-TM-X-55402, X-611-65-479

Descriptors: *Particle production, *Cosmic ray, *Electron spectrum, *Interstellar space, *Proton energy.

N66-22181 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
DYNAMICS OF T EQUALS 2 SIGMA - PI SYSTEM, I,
by K. Vasavada. 1965, 26p NASA-TM-X-56499

Descriptors: *Hyperon, *Meson-nucleon interaction, *Elementary particle, *Resonance.

N66-22192 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
EXCITATION OF ATOMIC HYDROGEN BY LITHIUM ATOMS,
by I. M. Cheshire, and H. L. Kyle. 1965, 8p
NASA-TM-X-56457

Descriptors: *Atomic excitation, *Quantum number, *Atomic collision, *Hydrogen atom, *Lithium.

N66-22193 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE DYNAMICS OF J EQUAL 3/2PLUS BAR XI AND KN SYSTEMS IN THE 27 FOLD REPRESENTATION.
Technical rept.,
by J. C. Pati, and K. Vasavada. Apr 65, 19p
NASA-TM-X-56502, TR-455
Grants NsG-398, AF-AFOSR-500-64
Prepared in cooperation with Maryland Univ., College Park. Supported in part by Grant NSF-GP-3221.

Descriptors: *Elementary particle, *Hyperon, *Baryon, *Kaon, *Meson, *Spin dynamics.

N66-22196 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
QUASI BIENNIAL VARIATION OF COSMIC RAYS,
by K. Maeda, and T. Suda. 1965, 26p NASA-TM-X-56690
Prepared in cooperation with Meteorological Research Institute.

Descriptors: *Tropics, *Annual variation, *Cosmic radiation, *Radiation intensity.

N66-22210 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
CORRELATED MAGNETIC TAIL AND RADIATION BELT OBSERVATIONS,
by N. F. Ness, and D. J. Williams. Jul 65, 14p
Rept. nos. X-612-65-285, NASA-TM-X-56665

Descriptors: *Explorer XVIII satellite, *Magnetic storm, *Radiation belt, *Magnetosphere.

N66-22211 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Southwest Center for Advanced Studies, Dallas, Tex.
COLLISIONAL-DISSOCIATIVE RECOMBINATION OF ELECTRONS WITH MOLECULAR IONS,
by C. B. Collins. Mar 65, 42p
Grant NsG-269-69
NASA CR-64053

Descriptors: *Molecular dissociation, *Electron-ion recombination, *Plasma physics.

N66-22214 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
SYSTEMATICS OF FISSION BASED ON THE EXPONENTIAL MASS FORMULA,
by A. G. W. Cameron. 1965, 17p NASA-TM-X-56635

Descriptors: *Fission, *Threshold, *Neutron, *Nuclear physics.

N66-22224 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
CHARGE RATIO OF COSMIC-RAY ELECTRONS,
by F. C. Jones. 1965, 9p NASA-TM-X-56668

Descriptors: *Cosmic radiation, *Electron, *Positron.

N66-22227 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
Enrico Fermi Inst. for Nuclear Studies, Chicago Univ., Ill.
COSMIC RAYS AND THEIR FORMATION OF A GALACTIC HALO,
by E. N. Parker. Feb 65, 41p EFINS-65-9
Grant NsG-96-60
NASA CR-57491

Descriptors: *Cosmic radiation, *Galactic magnetic field.

N66-22228 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
ELECTRON ACCELERATION IN THE TRANSITION REGION BEHIND THE EARTH'S BOW SHOCK,
by D. L. Webster. 1964, 22p NASA-TM-X-56197

Descriptors: *Bow shock, *Electron accelerator, *Transition point, *Magnetosphere.

N66-22237 **Field 20H**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, New York. Goddard Inst. for Space Studies.
COMPOSITION OF MATTER IN NUCLEAR STATISTICAL EQUILIBRIUM AT HIGH DENSITIES,
by A. G. W. Cameron, and S. Tsuruta. 1965, 34p
NASA-TM-X-56655

Descriptors: *High temperature research, *Neutron, *Nuclear physics.

N66-22251 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

DOUBLE COMPTON EFFECT WITH HIGH INTENSITY RADIATION,
by O. V. Roos. 1965, 23p
Contract NAS7-100
NASA CR-62146

Descriptors: *Compton effect, *Electromagnetic radiation, *Electron interaction, *Quantum mechanics, *Wave function.

N66-22258 **Field 20H**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE CONTINUAL ACCELERATION OF SOLAR PROTONS IN THE ME V REGION,
by D. A. Bryant, U. D. Desai, T. L. Cline, and F. B. McDonald. 1965, 11p NASA-TM-X-56274

Descriptors: *Detector, *Energy spectrum, *Particle acceleration, *Proton energy, *Solar proton.

N66-22305 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
Westinghouse Research Labs., Pittsburgh, Pa.
ELECTRON COLLISION CROSS SECTIONS IN METAL VAPORS.
Summary rept.,
by J. F. Nolan. 26 Jan 66, 66p Rept. no. RM-66-9E5-Splas
Contract NAS3-7100
NASA CR-54670

Descriptors: *Helium, *Cesium vapor, *Electron collision, *Scattering cross section.

N66-22363 **Field 20H**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CALCULATION OF TRANSPORT PROPERTIES OF IONIZING ATOMIC HYDROGEN,
by N. T. Grier. Apr 66, 87p NASA-TN-D-3186

Descriptors: *Transport property, *High temperature research, *Hydrogen atom, *Ionization.

PB-169 887 **Field 20H**
CFSTI Prices: HC$8.60 MF$0.75
Commissariat a l'Energie Atomique, Saclay (France). Centre d'Etudes Nucleaires.
ETUDE DE LA REACTION 51V (P,N) 51 CR ET CONTRIBUTION A LA SPECTROSCOPIE DE 51 CR (Study of the V51 (p,n) Cr51 Reaction and the Energy Levels in Cr51).
Doctoral thesis in French,
by Yves Cassagnou. 1965, 81p CEA-R-2832
Text in French; Attached Summary in English.

Descriptors: (*Vanadium, Proton bombardment), (*Proton bombardment, Vanadium), (*Chromium, Nuclear energy levels), Neutrons, Gamma rays, Nuclear cross sections, Excitation, Nuclear spins, France.

Neutrons and gamma rays from the reaction 51V (p,n) 51Cr have been studied between 2.3 and 5.1 MeV. Energy levels of 51Cr at 0.75, 1.15, 1.35, 1.47 and 1.56 MeV and unresolved levels at 1.94, 2.4, 2.75 and 2.9 MeV are observed. The gamma ray cascades of the low-lying states of 51Cr up to 2.5 MeV excitation energy have been completely determined through coincidence measurements. From the cascade ratios and gamma ray yields, excitation functions for the 51V (p,n)51Cr reactions, leading to the five lowest levels of 51Cr have been obtained from reaction threshold to 4.6 MeV. The analysis of cross section fluctuations with good resolution shows they are due to the excitation of unresolved compound nucleus isolated resonances. From the decay scheme and on Hauser-Fesbach calculation of the 51V (p,n) excitation functions, spin assignments of 3/2minus, or 5/2minus (0.75 MeV), 7/2minus (1.15 MeV), 3/2minus (1.35 MeV), 5/2minus (1.47 MeV) are proposed. (Author)

AD-423 098 See Field 9A

AD-633 654 See Field 20J

AD-633 785 See Field 18B

AD-633 951 See Field 20J

AD-633 988 See Field 12A

BNL-948 See Field 20G

NYO-72-28 See Field 20G

PB-170 548 See Field 4A

PB-170 554 See Field 7B

20I. PLASMA PHYSICS

AD-296 044 Field 20I, 20N
CFSTI Prices: HC$2.60
General Dynamics/Astronautics, San Diego, Calif. Space Science Lab.
MICROWAVE INTERACTIONS WITH INHOMOGENEOUS PARTIALLY IONIZED PLASMAS,
by A. H. Kritz. Nov 62, 28p ERR-AN-225
Contract DA-04-495-ARD-3383
Prepared for presentation at the Fall Meeting of the Western States Section of the Combustion Institute 1962.

Descriptors: (*Plasma medium, Microwaves), (*Microwaves, Plasma medium), Electromagnetic waves, Equations, Ionization, Dielectric properties.

Microwave interactions with inhomogeneous plasmas are often studied by employing a simplified electromagnetic approach, i.e., by representing the effects of the plasma by an effective dielectric coefficient. The problems and approximations associated with this procedure are discussed. The equation describing the microwave field in an inhomogeneous partially ionized plasma is derived, and the method that has been applied to obtain the reflected, transmitted, and absorbed intensities in inhomogeneous plasmas is presented. The effect of the variation of the collision frequency profile on the interaction of microwaves with inhomogeneous plasmas was studied in order to obtain an estimate of the degree of error which may result when constant collision frequency is assumed instead of a more realistic collision frequency profile. It is shown that the degree of error is of particular importance when microwave analysis is used as a plasma diagnostic. (Author)

AD-451 426 Field 20I
CFSTI Price: HC$5.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
AN ANNOTATED BIBLIOGRAPHY ON PLASMAS IN CUSPED MAGNETIC FIELDS AND SIMILAR GEOMETRIES.
Library bulletin bibliography series.
Aug 64, 51p TG-230-B4

Descriptors: (*Plasma physics, Bibliographies), (*Magnetic fields, Plasma medium), (*Magnetohydrodynamics, Bibliographies), Geometric forms, Thermonuclear reactions.

AD-459 312 Field 20I, 20C
CFSTI Price: HC$7.60
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
SOME CHARACTERISTICS OF AN ELECTRICAL DISCHARGE TRANSVERSE TO A SUPERSONIC SEEDED NITROGEN PLASMA STREAM WITH COLD-COPPER ELECTRODES,
by K. E. Tempelmeyer, J. M. Whoric, L. E. Rittenhouse, and M. L. McKee. Mar 65, 74p AEDC-TR-65-52
Contract AF 40(600)-1000,
Projs. AF-7778, ARO-PL2287,
Task 777805
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Plasma medium, Electric discharges), (*Electric discharges, Supersonic flow), Nitrogen, Copper, Electrodes, Field emission, Voltage, Enthalpy.

Some characteristics of a steady, direct-current electrical discharge transverse to a supersonic seeded nitrogen plasma are presented. The discharge from cold-copper electrodes had an overall voltage-current characteristic which was positive in all cases. The effects of (1) the type of seed (K_2CO_3 or NaK), (2) the seeding rate (about 0.2 to 2 percent K or NaK by weight), (3) the static pressure level (from 0.3 to 1.0 atm), and (4) the plasma enthalpy level (from about 1250 to 1800 kcal/kg) on the discharge are given in figure form. Dynamic data were also recorded and demonstrate that rather large fluctuations having frequencies of a few hundred cps exist in the current. It is proposed that the electrodes introduce electrons into the conducting plaxma through field emission. The discharge appears diffuse in the core of the plasma and may be quantitatively explained with an existing nonequilibrium, elevated-electron temperature theory. (Author)

AD-470 771 Field 20I
CFSTI Prices: HC$2.60 MF$0.50
Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
ONE-DIMENSIONAL MAGNETOHYDRODYNAMIC EQUATIONS FOR A NON-IDEAL GAS WITH APPLICATION TO SINGLY IONIZING ARGON.
Technical rept.,
by Wendell Norman. Sep 65, 26p AEDC-TR-65-185
Contract AF 40(600)-1200,
Proj. AF-7778
Prepared in cooperation with ARO, Inc., Arnold Air Force Station, Tenn.

Descriptors: (*Magnetohydrodynamics, Equations), (*Supersonic flow, Argon), One-dimensional flow, Magnetic fields, Electric fields, Computers, Gas ionization, Plasma accelerators.

The one-dimensional magnetohydrodynamic equations are given in a form suitable for computer solution for an arbitrary gas model. Evaluation of certain parameters for the case of argon shows that the upper limit on the ratio of the electric field strength to the magnetic field strength for acceleration of a supersonic flow in a constant-area accelerator is strongly influenced by non-ideal gas effects. (Author)

AD-633 593 Field 20I
CFSTI Prices: HC$3.00 MF$0.75
Illinois Univ., Urbana, Coordinated Science Lab.
INVESTIGATION OF DENSE PLASMA UNDER A STRONG ELECTRIC FIELD,
by Clifford W. Mendel Jr. May 66, 80p Rept. no. R-289
Contract DA-28-043-AMC-00073 (E),
Proj. DA-200-14501B31F

Descriptors: (*Plasma medium, Electrical properties), Electric fields, Plasma physics, Electron density, Electrical conductance, Plasma oscillations, Magnetic pinch, Hydrogen.

A hydrogen plasma of density approx. 10 to the 16th power per cc and electron temperature approx. 200 eV was investigated under electricl fields of 100 to 500 V/cm. A pinch of pinch ratio approx. 3 was found to be hydrodynamically stable for approx. 2 microsec. during which the experiment was performed. A sharp burst of runaway electrons of total current of the order of amperes occurred and disappeared shortly after conduction began. Large low frequency oscillations believed to be ion-acoustic oscillations appeared and give rise to very high resistivities in qualitative agreement with recent theories on plasma conductivity. (Author)

AD-633 605 Field 20I
CFSTI Prices: HC$4.00 MF$1.00
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE GLOW DISCHARGE IN MIXTURES OF He:Ne AND He:Xe.
Master's thesis,
by Robert Fredrick Weber. Mar 66, 146p GSP/PH/66-2I

Descriptors: (*Glow discharges, Helium group cases), (*Helium, Glow discharges), (*Neon, Glow discharges), (*Xenon, Glow discharges), Electrophoresis, Discharge tubes, Theory, Gas ionization, Plasma medium, Analysis, Mixtures.

The low pressure (3 to 15 mm Hg) glow discharge operating in He, Ne, Xe, and He:Ne and He:Xe mixtures (96:4 to 20:80) was used to study moving striations and the effects of electrophoresis and cataphoresis on the striations and other parameters of the discharge. The experimental work is accompanied by a concise review of positive column theory and moving striations theory for the conditions of the experimental study. The theories of electrophoresis and cataphoresis are also developed. (Author)

AD-633 626 Field 20I, 20C
CFSTI Prices: HC$3.00 MF$0.75
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
EVOLUTION OF A PLASMA PUFF IN A LONGITUDINAL MAGNETIC FIELD.
Technical memo.,
by S. J. Moss. Jan 66, 69p TG-806
Contract NOw-62-0604-c

Descriptors: (*Plasma physics, Production), (*Magnetic fields, Plasma physics), Model theory, Magnetic pinch, Magnetohydrodynamics.

The hydromagnetic model of the evolution of a plasma puff in a B sub z field described by Waelbroeck has been used to analyze the characteristics of the plasma produced by the APL conical pinch gun. The analysis is based on fitting the signals induced in single turn magnetic pickup loops by the passing plasma. In the cases studied good fits to the signals have been achieved and the characteristic parameters of the plasma found. This analysis applied to plasma generated by the APL theta-pinch gun has not been successful. In the two cases studied, the lack of good fits is attributed to the presence of a sizeable amount of trapped field in the puff which is present along the entire flight path through the B sub z field. (Author)

AD-633 646 Field 20I, 20F
CFSTI Prices: HC$4.00 MF$1.00
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
THE APPLICATION OF A DIFFERENTIAL INTERFEROMETER TO AN AXIALLY SYMMETRIC ARC HEATED PLASMA.
Master's thesis,
by Jimmy D. Lamb. Mar 66, 142p GSP/PH/66-11

Descriptors: (*Plasma physics, *Interferometers), (*Probes (Electromagnetic), Interferometers), Refractive index, Argon, Plasma medium, Optics, Phase shift, Optical instruments.

The refractive index of an atmospheric argon arc-heated plasma was measured with nearly monochromatic 5463 A light. The measurement was made with a differential interferometer which was compact and easy to set up and use. The basic

components of the interferometer are two Wollaston prisms and a concave mirror. One prism separates plane polarized light into two diverging components to provide an optical path separation through the test object space. Optical inhomogeneities in the (plasma) object result in phase shifts between the separated rays. These phase shifts are doubled during the return passage of the rays upon reflection by the concave mirror. A second Wollaston prism, analyzer, and camera lens produce an interference fringe pattern which can be photographically recorded. The plasma induced phase shifts produce deflections of the nominally straight and parallel fringes. These deflections are proportional to the first derivative of the optical path through the plasma. Integration of the deflection curves was performed to yield the optical path shifts relative to air as a function of lateral distance.

AD-633 651 **Field 20I, 19A, 18C**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
TIME RESOLVED SPECTROSCOPY OF EXPLODING WIRES.
Master's thesis,
by Roger S. Case Jr. Mar 66, 108p GSP/PH/66-2

Descriptors: (*Plasma medium, Spectroscopy), (*Exploding wires, Spectroscopy), (*Spectrum analyzers, Design), Cameras, Silver, Gold, Aluminum, Copper, Nickel, High-speed photography, Nuclear explosions, Simulation.

Identifiers: Time-resolved spectroscopy.

The paper reports the design, construction, and calibration of a time resolving spectrograph camera system which was used to study the temperature and opacity as functions of time in plasmas produced by exploding wires of five elements (Ag,Au,Al,Cu,Ni); the differences in the spectra produced by wires exploded in a vacuum environment and those exploded at atmospheric pressure were also studied. Photographs of the spectra produced by copper wires exploded both in air and in a vacuum environment, and photographs of the system components are included. The recording time at 3000 rps for this instrument was .26 microsec: the reciprocal dispersion of the spectrograph and camera was 34.7A/mm. The system was astigmatic.

AD-633 653 **Field 20I, 20A, 20N**
CFSTI Prices: HC$3.00 MF$0.50
Polytechnic Inst. of Brooklyn, N. Y. Microwave Research Inst.
DIFFRACTION BY A HALF PLANE IN A COMPRESSIBLE HOMOGENEOUS PLASMA.
Research rept.,
by Frank M. Labianca, and Leopold B. Felsen.
17 Jan 66, 55p PIBMRI-1304-65
Contract AF 19 (628)-2357, ARPA Order-529,
Proj. AF-5635,
Task 563501
AFCRL 66-72

Descriptors: (*Plasma medium, *Diffraction), (*Electromagnetic waves, Plasma medium), (*Acoustics, Plasma medium), Integral equations, Propagation, Boundary value problems, Slot antennas, Electromagnetic fields, Wave transmission, Refractive index, Numerical analysis.

An exact solution, developed by means of the Wiener-Hopf technique, is given for the electromagnetic (optical) and pressure (acoustic) fields generated by a plane wave incident on a perfectly conducting half plane imbedded in a homogeneous, warm plasma. From an asymptotic evaluation by the method of steepest descent, it is found that in addition to reflected optical and acoustic plane waves coupled at the boundary, and to a cylindrically spreading diffraction field appearing to emanate from the edge and penetrating both the illuminated and geometric-optical shadow regions, there exist edge diffraction effects in the form of surface waves and lateral waves. Relevant characteristics of these wave species are described and interpreted in simple physical terms via ray optical techniques. Some numerical data are also given. Although the plasma model is idealized, the results should be useful in predicting wave excitation phenomena to be associated with edge singularities. (Author)

AD-633 670 **Field 20I, 11C**
CFSTI Prices: HC$5.00 MF$1.00
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
A STUDY OF THE PROTECTIVE EFFECT OF A THIN FILM ON A SURFACE EXPOSED TO SPUTTERING.
Master's thesis,
by Robert Kelley Parker. Mar 66, 157p SP-PH/66-15

Descriptors: (*Plasma medium, Sputtering), (*Sputtering, Protective coverings), (*Metal films, Gallium), Metal coatings, Tantalum, Gas discharges, Argon, Ion bombardment, Surfaces, Erosion.

A serious problem in the design of plasma devices has been the erosion of material surfaces in contact with an energetic plasma. A technique for the protection of surfaces exposed to the destructive effects of sputtering was investigated. The technique involves the coating of a metallic substrate (tantalum) with a thin protective film of gallium. Although no quantitative measurements of the protective effect were obtained, the existence of the protective effect was definitely established. The effect was found to be substantial at ion energies near the threshold potential. However, the effect was found to have an upper limit near or below 100 ev. This protective effect would have its best application under conditions of high current density and low bombardment energies.

AD-633 730 **Field 20I**
CFSTI Prices: HC$5.00 MF$1.00
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
RETROGRADE ARC AND CATHODE SPOT MOTION IN CROSSED ELECTRIC AND MAGNETIC FIELDS.
Master's thesis,
by Salvatore F. Giannotta. Jun 66, 164p GSP-PH/66-6

Descriptors: (*Plasma physics, Electrodes), (*Electric arcs, Motion), (*Gas discharges, Motion), Plasma medium, Argon, Tungsten, Carbon, Cathodes, Thermionic emission, Vapors, Copper, Electric fields, Magnetic fields.

Identifiers: Cathode spots, Retrograde motion (Plasma physics).

Retrograde Arc and Cathode Spot motions on various electrode configurations were examined in a subatmospheric argon environment. Emphasis was placed on the study of semi-stationary arc modes; especially the arc shape, curvature, and arc channel radii, in addition to cathode spot patterns and frequencies of occurrence. Thermionic arcs with tungsten and carbon cathodes were also investigated. Retrograde motion was observed for the first time for arcs which moved completely around fixed electrodes. The highest known arc currents were also achieved for retrograding arcs. Intensely bright, conically shaped protrusions were found on copper plate electrodes which seem to be part of the cathode spots, or possibly the cathode spots themselves, for certain cases. These conical shapes may be extremely high-pressure cathode vapor. Cathode vapor jets were observed to be driven into the amperian direction in all cases in which a magnetic field was present. Measurements of arc channel radii and current densities for copper electrodes at pressures of 6 and 40 millimeters of mercury are reported.

AD-633 974 **Field 20I, 20D**
CFSTI Prices: HC$6.00 MF$1.25
General Dynamics Corp., San Diego, Calif. General Atomic Div.
A STUDY OF PLASMA TURBULENCE.
Final rept., 24 Apr 62-19 Sep 65,
by W. E. Drummond, and J. H. Malmberg. May 66, 248p GA-6776
Contracts AF 29 (601)-5338, AF 29 (601)-6366
Proj. AF-5710
AFWL TR-65-190

Descriptors: (*Plasma physics, Turbulence), Dynamics, Theory, Experimental data.

This report summarizes results of a three-year program of experimental and theoretical research to investigate turbulence in collisionless plasmas. The quasi-linear theory of plasma turbulence is extended to include the effect of resonant and non-resonant mode-coupling terms. The theory, originally done in the time domain, is applied to the case of spatially growing waves. The generation of electromagnetic radiation at twice the plasma frequency and microwave scattering from plasma turbulence are investigated theoretically. The kinetic theory of unstable plasmas is systematically developed. A measurement of the Landau damping of electrostatic plasma waves is described. The results agree in detail with the predictions of the theory. The growth of unstable plasma waves due to a gentle bump on the velocity distribution function is measured. The termination of the growth, due to nonlinear effects, (i.e., the diffusion of particles in the velocity distribution function by the electric fields of the wave) is observed. These results are also in quantitative agreement with the theory. This report contains the full text of eighteen scientific papers resulting from this research program. In these papers the above results and other related research are described in detail. (Author)

AD-634 023 **Field 20I**
CFSTI Prices: HC$2.00 MF$0.50
Aerojet-General Nucleonics, San Ramon, Calif.
RESEARCH ON UNSTABLE OSCILLATIONS IN ENERGETIC ARCS.
Final technical rept., 1 Mar 65-30 Apr 66,
by Carl B. Kretschmer. 27 May 66, 49p AN-1512
Contract AF 49 (638)-1548
Proj. AF-9752
Task 975201
AFOSR 66-0890

Descriptors: (*Electric arcs, *Plasma oscillations), Argon, Nitrogen, Hydrogen, Helium, Electrical properties, Ions, Vacuum, Cathodes, Plasma medium, Stability.

Gas-fed hollow-cathode vacuum arcs in argon, nitrogen, hydrogen and helium were studied. These arcs operate in a magnetic field of several kG and have current density approx. 100 A/sq.cm. voltage approx. 100 V, density approx. 2 x 10 to the 14th power/cc, electron temperature approx. 1 eV, and ion temperature ranging from 2 eV in hydrogen to 32 eV in argon. Temperatures were determined spectroscopically. The arc column is essentially completely ionized and consists largely of doubly charged ions (except in hydrogen). The current is carried by a small fraction (approx. 0.02) of the electrons having temperature 20-50 eV--much higher than the main electron population. These fast electrons control the conductivity at a sufficiently high value to make the longitudinal electric field very small. They acquire energy in passing through the cathode sheath and lose it in coulomb collisions with slow electrons, in ionizing and exciting ions, and in exciting drift waves. In spite of these losses they reach the anode with energies of 20-50 eV. More than half of the input power to the argon arc is radiated in the vacuum ultraviolet. Azimuthally propagating drift waves are present at approx. 35 kc and in the range 150 kc to several Mc. The latter are excited by the fast electrons and heat the ions by cyclotron absorption. Dispersion relations for these waves are presented. (Author)

N66-21355 Field 20I
CFSTI Prices: HC$3.00 MF$0.50
Princeton Univ., N. J. Dept. of Aerospace and Mechanical Sciences.
CYLINDRICAL SHOCK MODEL OF THE PLASMA PINCH,
by G. A. Rowell. Feb 66, 54p Rept. no. 742
Grant NsG-306-63
NASA CR-71412

Descriptors: *Mathematical model, *Plasma pinch, *Shock wave propagation, *Current sheet, *Gas dynamics.

N66-21655 Field 20I
CFSTI Prices: HC$3.00 MF$0.75
General Motors Research Labs., Warren, Mich.
CESIUM PLASMA SPECTROSCOPY. ELECTRON NUMBER DENSITY MEASURED BY STARK SHIFT OF SPECTRAL LINES.
Final rept.,
by R. J. Donohue, and R. F. Majkowski. 14 Jan 66, 93p
Contract NAS3-6470
NASA CR-71394

Descriptors: *Cesium plasma, *Electric discharge, *Plasma discharge, *Stark effect, *Electron density, *Spectral line width.

N66-21771 Field 20I
CFSTI Prices: HC$2.00 MF$0.50
Pennsylvania State Univ., University Park. Ionosphere Research Lab.
TRANSMISSION AND REFLECTION OF ELECTROMAGNETIC WAVES NORMALLY INCIDENT ON A WARM PLASMA,
by C. Comstock. 1965, 30p
Grant NsG-134-61
NASA CR-71404

Descriptors: *Electromagnetic wave, *Wave reflection, *Wiener-Hopf equation.

N66-22229 Field 20I
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
EXPERIMENTS ON ION-CYCLOTRON-WAVE GENERATION USING AN ELECTROSTATICALLY-SHIELDED RF COIL,
by H. J. Hettel, G. M. Prok, R. Krawec, and C. C. Swett.1965, 19p NASA-TM-X-52091
Prepared for presentation at the American Phys. Society Meeting, Washington, D. C., 26-29 Apr 1965.

Descriptors: *Coil, *Hydrogen plasma, *Plasma physics, *Power density.

AD-633 619 See Field 7D

AD-634 038 See Field 20N

AD-634 083 See Field 20N

AD-634 098 See Field 10B

MATT-358 See Field 18A

20J. QUANTUM THEORY

AD-633 654 Field 20J, 20H
CFSTI Prices: HC$2.00 MF$0.50
Uppsala Univ. (Sweden). Quantum Chemistry Group.
LINKED CLUSTER THEOREM AND THE GREEN'S FUNCTION EQUATIONS OF MOTION FOR A MANY FERMION SYSTEM,
by Donald H. Kobe. 1 Dec 65, 48p Scientific-3
Contract AF 61 (052)-874
ARL 66-0097

Descriptors: (*Fermions, *Green's function), (*Equations of motions, Fermions), Quantum statistics, Iterative methods, Perturbation theory, Graphics, N-body problem, Sweden.

Identifiers: Cluster theory.

The equations of motion for the general many-time causal Green's functions for a fermion system are iterated and shown not to lead to unlinked graphs, which is a general proof of the linked cluster theorem. An explicit expression is obtained for the perturbation expansion of an arbitrary Green's functions which is applied to the one and two particle Green's functions. By connecting lines systematically in a set of diagrams obtained from the equations of motion, the usual topologically different linked graphs and rules are generated. (Author)

AD-633 674 Field 20J
CFSTI Prices: HC$1.00 MF$0.50
Wisconsin Univ., Madison. Theoretical Chemistry Inst.
MOMENTUM OPERATORS IN QUANTUM MECHANICS,
by A. M. Arthurs. 28 Apr 66, 12p WIS-TCI-164
Grant NsG-275-62
Prepared in cooperation with Mathematics Research Center, Univ. of Wisconsin, Madison, under contract DA-11-022-ORD-2059.

Descriptors: (*Quantum mechanics, *Operators (Mathematics)), Momentum, Wave functions, Functional analysis, Integration.

A representation for momentum operators corresponding to real observables is obtained by using functional integration in phase space. (Author)

AD-633 761 Field 20J, 20C
CFSTI Prices: HC$1.00 MF$0.50
Rochester Univ., N. Y. Dept. of Physics and Astronomy.
COUPLING AND RECOUPLING OF RELATIVISTIC STATES. II. NOTE ON THE SYSTEMATICS OF MANY PARTICLES SYSTEMS,
by Haim Goldberg. 1 Apr 66, 24p UR-875-134
Contract AT (30-1)-875

Descriptors: (*Quantum mechanics, *Field theory), S-matrix, Invariance, Functions, Elastic scattering, Parity, Particles, Nuclear physics.

The direct product of many irreducible representations of the Poincare group is discussed. A procedure is suggested for the decomposition in the canonical scheme, which is not an iteration of the 2-particles method. Also, it is independent of the c.m.s. Corresponding expression for S-matrix elements of many particle processes is given. The properties of the invariant functions associated with elastic scattering in case of parity, time reversal and crossing symmetries is discussed, as well as in case of identical particles. (Author)

AD-633 951 Field 20J, 20H, 7D
CFSTI Prices: HC$2.00 MF$0.50
Illinois Univ., Urbana. Dept. of Physics.
A SIMPLE RELATIVISTIC CALCULATION OF THE ELECTROMAGNETIC FORM FACTORS OF THE DEUTERON,
by Klaus Dietz, and Melvin Month. 1966, 46p
Contract Nonr-1834 (05)

Descriptors: (*Deuterons, Electromagnetic properties), Relativity theory, Field theory, Quantum mechanics, Nuclear energy levels, Neutrons, Protons, Wave functions, Special functions, Electrons, Elastic scattering.

Identifiers: Form factors.

A simple method of extracting anomalous singularities from the electromagnetic vertex function of bound states is proposed. The method was applied to the electromagnetic form factor of the deuteron and its relevance was proven by a thorough comparison with the experimental data. (Author)

AD-413 089 See Field 20L

AD-633 624 See Field 20E

20K. SOLID MECHANICS

AD-465 696 Field 20K
CFSTI Prices: HC$4.60 MF$0.50
General Technology Corp., Elgin, Ill.
STRESS DISTRIBUTION AT TWO NORMALLY INTERSECTING CYLINDRICAL SHELLS,
by A. C. Eringen, and E. S. Suhubi. Apr 65, 47p
Technical rept. TR-3-7
Contract NObs-90157,
Proj. S-FOB

Descriptors: (*Structural shells, Stresses), (*Cylindrical bodies, Stresses), Distribution, Boundary value problems, Pressure, Differential equations.

The boundary value problem concerned with the state of stress in two normally intersecting circular cylindrical shells subjected to internal pressure is formulated. The differential equations of the two shells are solved for a small ratio of radii subject to edge conditions along the intersection curve and at the ends of the cylinders. (Author)

AD-633 476 Field 20K, 19D
CFSTI Prices: HC$4.00 MF$0.75
Utah Research and Development Co., Salt Lake City.
THEORETICAL AND EXPERIMENTAL STUDY OF LOW-VELOCITY PENETRATION PHENOMENA.
Final rept. (phases 1 and 2), 25 Jun 63-24 Jun 64,
by Emerson T. Cannon. 24 Jun 64, 105p
Contract DA-19-129-AMC-150 (X), ARPA Order-267

Descriptors: (*Impact prediction, Penetration), (*Viscoelasticity, Impact prediction), Velocity, Armor, Correlation techniques, Mathematical models.

Phase I has consisted of a literature survey to determine the state of the art. The results are summarized and a bibliography is included. It is concluded that semi-empirical correlation formulae and oversimplified theories do not give the results needed for armor design and are inadequate as a guide to understanding low-velocity impact phenomena. Phase II has consisted of the development of a new method of describing the elasto-plastic behavior of a material under impact conditions. The non-linear differential equations involved are expressed in a tensor formulation particularly suitable for computer calculations. The method used is very general and allows a wide variety of boundary conditions and material properties to be used. The work is described and the results of preliminary calculations are presented in this report. (Author)

AD-633 582 Field 20K
CFSTI Prices: HC$1.00 MF$0.50
Bureau of Ships, Washington, D. C.
STRESS STATE NEAR A RECTANGULAR OPENING WITH CURVED ANGLES IN A CYLINDRICAL SHELL,
by O. M. Guz, and S. O. Goloborodko. Apr 66, 9p BuShips Trans-983
TT 66-61386
Trans. of Prikladnaya Mekhanika (USSR) v10 n6 p594-9 1964.

Descriptors: (*Stresses, *Structural shells), (*Cylindrical bodies, Stresses), Mathematical analysis, USSR.

AD-633 586 Field 20K, 12A
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
CONCERNING THE INVERTIBILITY OF THE LYAPUNOV'S THEOREM OF ASYMPTOTIC STABILITY,

by I. G. Malkin. 8 Mar 66, 19p RSIC-526
TT 66-61388
Trans. of Prikladnaya Matematika I Mekhanika (USSR) v18 p129-38 1954.

Descriptors: (*Perturbation theory, Stability), (*Equations of motion, Stability), Functional analysis, USSR.

Identifiers: Lyapunov theorem.

This paper sets forth the necessary and adequate requirements for the existence of a Lyapunov function that will satisfy all conditions required by his theorem of asymptotic stability. (Author)

AD-633 644 **Field 20K**
CFSTI Prices: HC$6.00 MF$1.25
Foreign Technology Div., Wright-Patterson AFB, Ohio.
TRANSACTIONS OF THE SCIENTIFIC AND TECHNICAL CONFERENCE ON THE DAMPING OF VIBRATIONS (17-19 DECEMBER 1958),
15 Mar 66, 243p FTD-MT-64-507
TT 66-61396
Edited machine trans. of Trudy Nauchno-Tekhnicheskogo Soveshchaniya po Dempfirovaniyu Kolebanii, 17-19 Dec 58, Kiev, 1960 180p.

Descriptors: (*Vibration, *Damping), Vibration isolators, Symposia, USSR, Mechanics, Rods, Springs, Hysteresis, Internal friction, Stresses, Cermets, Heat-resistant metals + alloys, Ferromagnetic materials, Steel, Wire, Temperature, Ship hulls, Deformation, Shafts.

AD-633 658 **Field 20K, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
FATIGUE DURING ELASTIC-PLASTIC DEFORMATION,
by R. M. Shneiderovich. 21 Jan 66, 28p FTD-TT-65-1413
TT 66-61397
Unedited rough draft trans. of mono. Nauchno-Tekhnicheskoe Obshchestvo Mashinostroitelnoi Promyshlennosti. Tsentralnoe Pravlenie. Voprosy Mekhanicheskoi Ustalosti, Moscow, 1964 p194-210.

Descriptors: (*Fatigue (Mechanics), *Deformation), Stresses, Loading (Mechanics), Mathematical analysis, Functions.

AD-633 662 **Field 20K, 12A**
CFSTI Prices: HC$2.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
CONDITIONS OF ASYMPTOTIC STABILITY IN THE CASE OF UNSTABLE MOTION AND AN EVALUATION OF THE RATE OF DECREASE OF THE GENERAL SOLUTION,
by V. I. Zubov. 10 Mar 66, 34p RSIC-529
Trans. of Leningrad Univ. Vestnik (USSR) n1 p110-29 1957.

Descriptors: (*Equations of motion, Stability), Motion, Differential equations, Special functions (Mathematical), USSR.

Discussed are conditions for uniform stability and nonuniform asymptotic stability as well as the necessary and sufficient conditions for the asymptotic stability of the zeroth solution of a determined quality. Investigated are specific systems of differential equations by means of specific functions. (Author)

AD-633 673 **Field 20K**
CFSTI Price: MF$0.75
Army Engineer Waterways Experiment Station, Vicksburg, Miss.
THE ELASTIC RESPONSE OF BURIED CYLINDERS, CRITICAL LITERATURE REVIEW AND PILOT STUDY.
Technical rept. (final),
by G. E. Albritton, J. L. Kirkland, T. E. Kennedy, and A. F. Dorris. Apr 66, 104p TR-1-720
Task 13.010

Descriptors: (*Cylindrical bodies, Loading (Mechanics)), (*Underground structures, Elasticity), Captive tests, Reviews, Pressure, Strain (Mechanics), Dynamics, Rings, Sand, Pipes.

Three series of tests were conducted on the cylinder under both static and dynamic loading conditions in the Small (4-foot-diameter) Blast Load Generator. The cylinder had a test section length of 12 inches, a diameter of 6 inches, a stiffness EI/R cubed of 164, and a diameter-to-thickness ratio d/t of 50. The surface overpressures ranged from 0 to 350 psi static and from 100 to 250 psi dynamic. The depth of cover over the crown ranged from 0 to 12 inches of soil. Measurements were made of strain in the cylindrical section, surface overpressure, and the associated free-field pressure. The dynamic strains were 20 to 40 percent higher than the strains at an equivalent static load. Load cycling had negligible effect on the elastic response of the cylinder. Thrust was generally a linear function of the applied surface overpressure; however, moment was highly nonlinear and tended to increase at a decreasing rate. The state of the art concerning dynamic, elastic theory for rings was summarized, including an analysis of the mathematical and physical limitations of the currently available theories.

AD-633 676 **Field 20K, 20A**
CFSTI Prices: HC$2.00 MF$0.50
Houston Univ., Tex. Dept. of Mechanical Engineering.
THE IN-VACUO VIBRATIONS OF A SIMPLY SUPPORTED, RING-STIFFENED, MASS-LOADED CYLINDRICAL SHELL.
Technical rept.,
by C. D. Michalopoulos, and D. Muster. Jun 66, 35p TR-3
Contract Nonr-4492 (01),
Proj. NR-185-602

Descriptors: (*Vibration, *Stiffened cylinders), Structural shells, Vacuum, Elasticity, Dynamics, Acoustics.

The present investigation is an analytical study of the in-vacuo free vibrations of a simply supported, mass-loaded thin cylindrical shell which is reinforced by equally spaced ring stiffeners. Four masses are attached to each stiffening ring in a plane-symmetric fashion. The rotatory inertia of the mass loads is taken into account, but similar effects for the shell and ring stiffeners are neglected. Lagrange's equations are used to derive the dynamic equations of the structure. Results are given for various combinations of length, radius and thickness of the shell, number of stiffening rings, and value and position of mass loads. When the value of the masses is allowed to become zero, the results for the ring-stiffened shell are in close agreement with those of previous investigators. (Author)

AD-633 772 **Field 20K, 14B**
CFSTI Prices: HC$2.00 MF$0.50
Navy Marine Engineering Lab., Annapolis, Md.
MEASUREMENT OF COMPLEX SHEAR MODULUS OF VISCOELASTIC MATERIALS BY MECHANICAL IMPEDANCE METHODS,
by Andrew J. Roscoe III, E. V. Thomas, andW. Blasingame. May 66, 30p MEL-238/66
Proj. S-F013-11-08,
Task 1353

Descriptors: (*Materials, *Viscoelasticity), (*Shear stresses, Test methods), Measurement, Beams (Structural), Laminates, Sandwich construction, Damping.

The analytical prediction of damping performance as a function of frequency for laminated elastic-viscoelastic-elastic beams has been quite accurately carried out by several investigators by assuming previous knowledge of dimensions, constants of elastic materials, and dynamic shear parameters of viscoelastic materials. One investigation has shown vast differences in the results of measurements of dynamic shear modulus of the same viscoelastic materials by different facilities. To increase the accuracy of analytical predictions of structural damping in U. S. Navy ships, there is a need for accurate measurement of complex shear modulus. This report describes an experimental method which uses mechanical impedance measurements on a laminated sandwich beam with a viscoelastic layer that is thin compared to the elastic layers to measure the complex shear modulus of the viscoelastic material. Results of using the method show that it provides an accurate and repeatable measurement. (Author)

AD-633 776 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.75
Weidlinger (Paul), New York.
STRESSES IN AN ELASTIC-PLASTIC HALF-SPACE DUE TO A SUPERSEISMIC STEP LOAD.
Technical rept.,
by Alva T. Matthews, and Hans H. Bleich. Mar 66, 73p TR-4
Contract DA-30-069-AMC-8 (R)

Descriptors: (*Mechanical waves, Propagation), Elasticity, Plasticity, Stresses, Strain (Mechanics), Acoustics, Differential equations, Numerical analysis, Digital computrs, Mechanics.

The plane strain problem of a step load moving with uniform superseismic velocity V > c sub P on the surface of a half-space is considered for an elastic-plastic material obeying the von Mises yield condition. Using dimensional analysis the governing quasi-linear partial differential equations are converted into ordinary nonlinear differential which are solved numerically using a digital computer. To overcome computing difficulties asymptotic solutions are derived in the vicinity of a singular point of the differential equations. Numerical results are presented for a range of selected values of significant nondimensional parameters, i.e. of the surface load p sub o/k, of Poisson's ratio nu and of the velocity ratio V/c sub P. (Author)

AD-633 817 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
SLANTING SHELLS OF ROTATION OF VARIABLE THICKNESS IN SPATIAL TEMPERATURE FIELD,
by A. D. Kovalenko. 21 Jan 66, 19p FTD-TT-65-1376
TT 66-61419
Unedited rough draft trans. of Prikladnaya Mekhanika (USSR) v6 n3 p241-9 1960.

Descriptors: (*Thermal analysis, *Bodies of revolution), Elastic shells, Thermal stresses, USSR, Differential equations, Turbines.

AD-633 818 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ANTISYMMETRICAL STRESSED STATE OF A CONICAL SHELL OF VARIABLE THICKNESS,
by Ya. M. Grigorenko. 21 Jan 66, 15p FTD-TT-65-1377
TT 66-61420
Unedited rough draft trans. of Prikladnaya Mekhanika (USSR) v6 n4 p385-92 1960.

Descriptors: (*Stresses, *Structural shells), Conical bodies, Thickness, Approximation (Mathematics), USSR.

The author considers the antisymmetrical stressed state of a conical shell of variable thickness. A system of basic differential equations of the fourth

order is derived. An approximate equation in complex form is also obtained, and its solution is given in the form of hypergeometric functions. (Author)

AD-633 819 **Field 20K, 12A**
CFSTI Prices: HC$6.00 MF$1.25
Foreign Technology Div., Wright-Patterson AFB, Ohio.
FUNDAMENTAL PLANE STATIC PROBLEMS OF THEORY OF ELASTICITY FOR SIMPLY CONNECTED AND DOUBLY CONNECTED REGIONS,
by S. M. Belonosov. 9 Mar 66, 244p FTD-MT-64-389
TT 66-61421
Edited machine trans. of mono. Osnovnye Ploskie Staticheskie Zadachi Teoriya Uprugosti dlya Odnosvyaznykh i Dvusvyaznykh Oblastei, Novosibirsk 1962 231p.

Descriptors: (*Elasticity, Theory), Statics, Boundary value problems, Numerical analysis, Integral equations, USSR.

In the book there is expounded a new general method of solution of plane static problems of theory of elasticity. Main attention is paid to investigation of influence of angular points of region. There are given recommendations relative to numerical solution of plane problems with use of electronic computers. The book is intended for scientists studying theory of elasticity and boundary-value problems of mathematical physics connected with application of integral equations and methods of theory of functions of a complex variable. (Author)

AD-633 820 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
PLASTIC FLEXURE IN A FREELY-SUPPORTED CIRCULAR PLATE UNDER THE ACTION OF AN AXISYMMETRICAL LOAD,
by Xiun Zhu-Hua. 20 Jan 66, 12p FTD-TT-65-1477
TT 66-61422
Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, n6 p159-63 1963.

Descriptors: (*Loading (Mechanics), *Flexural strength), Plasticity, Deformation, Metal plates, USSR.

AD-633 942 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
INTEGRAL AND LOCAL STATEMENTS OF THE BALANCE EQUATIONS OF CONTINUUM MECHANICS FOR VARIABLE MASS REGIONS.
Technical rept.,
by Ray M. Bowen. 15 Jan 64, 33p TR-64-1

Descriptors: (*Continuum mechanics, *Integral equations), Equations of motion, Momentum, Tensor analysis, Vector analysis.

AD-633 985 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Watervliet Arsenal, N. Y. Benet Labs.
THE MUTUALITY OF STATIC AND KINETIC FRICTION.
Technical rept.,
by Thomas E. Simkins. Apr 66, 22p
WVT 6611

Descriptors: (*Friction, Time), Statics, Kinetics, Force.

An experiment was performed, the object of which was to observe directly the dependence of static friction force magnitudes upon the static contact time. Not only was there a complete lack of evidence that such a time-dependency exists, but in addition there were no static or starting friction forces which were observed to be greater than all the forces observed during subsequent sliding contact. A possible explanation for the contrary observations is given and is supported by results of a second experiment in which extensive sliding contact on a microscopic scale was observed prior to gross (visible) sliding. (Author)

AD-634 052 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
Syracuse Univ. Research Inst., N. Y.
DEFORMATIONS AND STABILITY OF SPHERICAL SHELLS.
Final technical rept., 11 Sep 60-10 Sep 64,
by R. M. Evan-Iwanowski. 10 Sep 64, 14p
SURI-1014-48
Grants DA-ARO (D)31-124-61-G24, DA-ARO (D)-31-124-61-G381
AROD 2465:13

Descriptors: (*Structural shells, *Mechanical properties), Deformation, Stability, Spheres.

The purpose of this research project is to investigate the deformations and stability of deep and shallow spherical shells under the action of concentrated loads, distributed (line) loads, and uniform pressure. The following specific objectives were pursued in the current phase of work: (1) to obtain experimental data for a broad range of geometry parameters for design purposes, and to compare these results with existing and proposed analytical solutions: (2) to present phenomenological behavior of shells before, during and after buckling; (3) to determine the parameters pertinent to the description of shell behavior and the ranges of these parameters within which distinctive trends of shell behavior can be established. (Author)

AD-634 109 **Field 20K**
CFSTI Prices: HC$4.00 MF$0.75
Louvain Univ. (Belgium). Institut de Mecanique Appliquee.
DYNAMIC BEHAVIOR OF SHELLS UNDER THERMAL STRESS.
Final rept.,
by Felix Buckens. 1965, 124p
Grant AF-EOAR-49-63,
Proj. AF-9782,
Task 978201
AFOSR 66-0898

Descriptors: (*Structural shells, *Dynamics), (*Thermal stresses, Structural shells), Vibration, Mechanical waves, Elasticity, Propagation, Belgium.

The effect of initial stress and in particular of thermal stress on the dynamical behavior of thin shells (vibration and propagation of bending waves) is studied. The case of a circular cylindrical is considered in detail, and several effects of initial stress and distributed moment evaluated. Methods of determining initial thermal stress and deflection are given and their effects on natural frequencies and modes considered. Local effects on the velocity of propagation of bending waves are studied in detail and quantitative evaluations are obtained. Comparison with experimental results is given. (Author)

N66-21696 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
North American Aviation, Inc., Columbus, Ohio.
INVESTIGATION OF THE SONIC FATIGUE CHARACTERISTICS OF RANDOMLY EXCITED ALUMINUM VISCOELASTIC PANELS AT AMBIENT TEMPERATURE,
by B. J. Moskal. Apr 66, 44p
Contract NAS1-4728
NASA CR-425

Descriptors: *Aluminum, *Panel, *Sound intensity, *Structural fatigue.

N66-21768 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Lockheed Missiles and Space Co., Huntsville, Ala. Huntsville Research and Engineering Center.
EXPERIMENTAL DAMPING STUDIES.
Monthly progress rept., 6 Jul-5 Aug 65,
20 Aug 65, 26p LMSC-HREC-A711769
Contract NAS8-20088
NASA CR-71628

Descriptors: *Vibration damping, *Decay rate, *Frequency response.

N66-21817 **Field 20K**
CFSTI Prices: HC$4.00 MF$0.75
Northrop Space Labs., Huntsville, Ala. Research and Analysis Section.
FORTRAN IV COMPUTER PROGRAM FOR THE EVALUATION OF NATURAL FREQUENCIES AND UNSTABLE VALUES OF THE THRUST FREQUENCY FOR A CIRCULAR CYLINDRICAL SHELL SUBJECTED TO A GIMBALED PERIODICALLY-VARYING END THRUST,
by A. D. Merville, and C. M. Pearson. 23 Aug 65, 115p TM-100, E20-114
Contract NAS8-11255
NASA CR-71537

Descriptors: *Circular shell, *Computer program, *Cylindrical shell, *Natural frequency, *Periodic function.

N66-22172 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
BUCKLING OF SEGMENTS OF TOROIDAL SHELLS,
by J. A. McElman, and M. Stein. 1965, 25p
NASA-TM-X-54995
Prepared for presentation at the AIAA Aerospace Science Meeting, New York, 25-27 Jan 1965.

Descriptors: *Buckling, *Curved surface, *Differential equation, *Gauss, *Nonlinear equation, *Toroidal shell.

N66-22209 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Harvard Univ., Cambridge, Mass.
DYNAMIC BUCKLING OF ELASTIC STRUCTURES - CRITERIA AND ESTIMATES,
by B. Budiansky. Jan 66, 49p Report no. SM-7
Contract NsG-559
NASA CR-66072
Prepared for presentation at the International Conference on Dynamic Stability of Structures, Northwestern Univ., Evanston, Ill., 18-20 Oct 1965.

Descriptors: *Critical loading, *Dynamic load, *Elastic strength, *Structural dynamics, *Buckling.

N66-22254 **Field 20K**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
A COMPARISON OF FRACTURE MECHANICS AND NOTCH ANALYSIS,
by P. Kuhn. 1965, 18p NASA-TM-X-56206
Prepared for presentation at the American Society for Testing and Mater., Spec. Comm. on Fracture Testing, Washington, 13 Jan 1965.

Descriptors: *Static loading, *Test method, *Fracture mechanics, *Notch strength.

N66-22267 **Field 20K**
CFSTI Prices: HC$2.00 MF$0.50
Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.
HYPERVELOCITY IMPACT EFFECTS ON LIQUID HYDROGEN TANKS.
Final rept., 1 Jul 64-30 Nov 65,
by C. W. Ferguson. 1965, 45p SM-52027
Contract NAS3-4193
NASA CR-54852

Descriptors: *Environment simulation, *Tank, *Cryogenic equipment, *Hypervelocity impact, *Structural material.

N66-22271 **Field 20K**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
SUPERSONIC FLUTTER OF SIMPLY SUPPORTED ISOTROPIC SANDWICH PANELS,
by M. S. Anderson, and L. L. Erickson. Apr 66, 52p NASA-TN-D-3171

Descriptors: *Supersonic flutter, *Numerical analysis, *Rectangular panel, *Sandwich construction, *Static aerodynamic characteristics.

AD-633 710 **See Field 8G**

AD-633 778 **See Field 12A**

AD-633 891 **See Field 11I**

AD-633 964 **See Field 20D**

AD-633 984 **See Field 11D**

AD-634 036 **See Field 20D**

20L. SOLID STATE PHYSICS

AD-413 089 **Field 20L, 20E, 9A, 20C K**
CFSTI Price: HC$8.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
SOLID STATE RESEARCH 1963 NO. 1.
13 Jun 63, 86p
Contract AF 19(628)-500

Descriptors: (*Solid state physics, Scientific research), Semiconductor devices, Masers, Materials, Magentic resonance, Semiconductors, Band theory of solids, Spectroscopy, Magnetic properties, Lasers, Glass, Transition elements, Rare earth compounds, Films, Optics.

Contents: Solid state device design, Materials research, Band structure and spectroscopy of solids, Spectroscopy of magnetic solids, Transition-metal and rare-earth compounds, Physics of thin films, Optics and infrared. (Author)

AD-464 733 **Field 20L, 7D**
CFSTI Price: HC$3.60
Westinghouse Research Labs., Pittsburgh, Pa.
TRANSPORT STUDIES OF DEFECT STRUCTURE INORGANIC COMPOUNDS.
Final technical rept., 30 Sep 64-31 Mar 65,
by R. R. Heikes, 31 Mar 65, 31p
Contract Nonr-3800 (00), ARPA order-300-3, Proj. NR-359-444

Descriptors: (*Inorganic compounds, Transport properties), (*Crystal lattice defects, Oxides), (*Oxides, Transport properties), Zirconium compounds, Mossbauer effect, Thorium compounds, Yttrium compounds, Seebeck effect, Electrical conductance, Platinum, Electrodes, Silver alloys, Magnesium compounds, Oxygen peroxide, Hydrogen.

Contents: Vacancies in substituted zirconia -- a Mossbauer study: The Seebeck coefficient of (Th02) sub 1-x (YO1.5) sub x: Conductivity and transference number in scandium-magnesium oxide solid solutions: Conductivity between 350C and 1250C of high purity, stabilized Zr02: The interaction of oxygen with platinum: A survey of the activity of silver-based alloy electrodes for the oxygen reduction in K0H solution: Three notes on the surface chemistry and catalytic activity of silver-magnesium oxide surfaces: Reactions of oxygen and hydrogen peroxide at silver electrodes in alkaline solutions: The low-temperature ortho-para conversion of hydrogen on silver: The desorption and isotopic exchange of oxygen at a silver surface.

AD-633 645 **Field 20L, 7D, 20F**
CFSTI Prices: HC$4.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ULTRAVIOLET REFLECTIVITY STUDIES OF CdS:Se SINGLE CRYSTAL SOLID SOLUTIONS.
Master's thesis,
by Lee Morgan Gutheinz. Jun 66, 106p GSP/PH/66-8

Descriptors: (*Ultraviolet spectroscopy, *Semiconductors), (*Cadmium alloys, Ultraviolet spectroscopy), (*Selenium alloys, Ultraviolet spectroscopy), Single crystals, Solid solutions, Band theory of solids, Atomic energy levels, Electron transitions, Crystallography, Cadmium compounds, Sulfides.

The reflection spectra of CdS:CdSe solid solution alloys have been measured at room temperature for photon energies in the range 4.0 - 10.0 ev. The shift in energy of several direct interband transitions (E0, E'0, E1, E2) with varying cation composition has been observed. The structure is interpreted in terms of an analogous zincblende model, which has been shown to differ from the wurtzite in the (0, 0, 1) direction in the folded zone scheme of Birman only by the omission of a small trigonal field perturbation. The observed monotonically increasing variation in E0 is in good agreement with that reported by Handelman and Kaiser. The variation in the transitions is qualitatively interpreted as resulting from an effective lattice parameter dilation which occurs in the alloying process. This dilation is shown to give rise to a potential of deformation which has a perturbing effect on the band edges. (Author)

AD-633 672 **Field 20L, 20B, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
ELECTRONOGRAPHIC INVESTIGATION OF THE NATURE OF CRYSTAL ORIENTATION AND FORMATION OF PHASES IN Sb Sb2Te4 AND PbBi4Te7 COMPOUNDS,
by A. G. Talybov. 17 Mar 66, 17p FTD-TT-65-1399
TT 66-61406
Unedited rough draft trans. of Azerbaidzhanskii Khimicheskii Zhurnal (USSR) v30 n6 p111-8 1963.

Descriptors: (*Semiconducting films, Phase studies), (*Antimony alloys, Films), (*Lead alloys, Films), Crystal structure, Sublimination, Tellurium alloys, Bismuth alloys, Intermetallic compounds, Annealing, USSR.

Identifiers: Antimony tellurides, Bismuth lead tellurides.

The nature of crystal orientation in SnSb2Te4 and PbBi4Te7 compounds was investigated. It was established that in the case of sublimation of SnSb2Te4 alloy on a celluloid film and rock salt without subsequent annealing thin ploycrystalline films are obtained. To obtain textured or monocrystalline film, it is necessary to sublimate this alloy on hot NaCl layers with subsequent annealing. When investigating samples of SnSb2Te4, the sublimation condition plays a greater role for the alloy. It was established that in the dependence upon the number of sublimation, the nature of orientation of crystals and chemical composition of the film change. The film of the basic alloy SnSb2Te4 is obtained at one sublimation only. It was established that the orientation of crystals of compounds PbBi4Te7 in thin layers at various annealing conditions is different. In contrast to SnSb2Te4 compound, the compound PbBi4Te7 does not change in composition from the sublimation conditions. (Author)

AD-633 715 **Field 20L, 20B**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ULTRASONIC STRESS WAVES IN CADMIUM SULFIDE,
Master's thesis,
by Craig Eugene Mahaffy. Mar 66, 100p GSP/PH/66-12

Descriptors: (*Ultrasonic properties, Semiconductors), (*Cadmium compounds, Sulfides), Stresses, Single crystals, Relaxation time, Electron capture, Copper, Silver, Impurities.

Identifiers: Theses.

The copper and silver doped cadmium sulfide crystals observed in the experiment exhibited essentially the same ultrasonic amplification characteristics as crystals grown from undoped, high-purity, cadmium sulfide powder. The relaxation time of electron trapping is not affected by the presence of the impurity elements copper and silver, at least if the impurity-element concentrations are restricted to those used in this experiment. The calculated value of .3 for the trapping factor in crystal 4 (CdS:Cu-30ppm), as compared to .5 calculated for all other crystals, is a possible indication that the impurity atoms formed trapping centers not present in the other, less heavily doped, crystals. If the restrictions imposed by the linear (small signal) approximation are not violated, the modified amplification equation of Uchida et al. correctly describes the experimentally observed ultrasonic amplification in cadmium sulfide. The disadvantage of the modified equation, in the experimental situation, is that it is possible to obtain apparent agreement between theory and experiment when nonlinear conditions are actually present in the crystal. This situation is made possible by the dependence of the theoretically predicted gain values on the experimentally observed values of maximum and minimum gain. For example, the effects of acoustic gain saturation can reduce the observed maximum gain which in turn will result in the ratio of the theoretically predicted maximum gain to minimum gain being reduced as well.

AD-633 955 **Field 20L, 9A**
CFSTI Prices: HC$1.00 MF$0.50
Harry Diamond Labs., Washington, D. C.
MEASUREMENTS OF MINORITY-CARRIER LIFETIME IN AN N-TYPE DIFFUSED SKIN,
by Robert J. Anstead. Apr 66, 25p TR-1320
Projs. DA-1P-523-801-A300, HDL-96300

Descriptors: (*Carriers (Semiconductors), Measurement), (*Transistors, Carriers (Semiconductors)), (*Semiconductors, Surface properties), Photoconductivity, Gases, Etched crystals, Abrasives, Germanium, Quality control, Diffusion, Test methods.

A modified photoconductivity method was used to measure the minority-carrier lifetime in an n-type, diffused skin. The measurements show the lifetime to be a function of surface conditions. The samples were exposed to gases, treated with etches, and subjected to abrasion. The effect of these treatments on the minority-carrier lifetime is compared with their effect on P-N-P germanium transistors. A short theoretical study of the measuring procedure is also included. (Author)

AD-634 032 **Field 20L, 20B, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Delaware Univ., Newark. Dept. of Physics.
THE INFLUENCE OF OXYGEN IN THE ULTRA-HIGH VACUUM RANGE ON ELECTRICAL PROPERTIES OF CdS.
Technical rept.,
by Karl W. Boer, and R. Schubert. May 66, 17p TR-7
Contract DA-31-124-ARO(D)-173
AROD 4461:8

Descriptors: (*Cadmium compounds, Sulfides), (*Sulfides, Electrical properties), Single crystals, Adsorption, Oxygen, Hydrogen, Carbon dioxide, Vacuum, Temperature, Pho-

toconductivity, Mass spectrum, Pressure, Semiconductors.

Identifiers: Cadmium sulfide.

Undoped CdS single crystals are kept in a vacuo of p < 10 to the -9th power torr. Adsorption of different gases (O2, H, CO2) was allowed by backfilling the system up to a pressure in the 0.00001 torr range through a sensitive leak valve; crystal conductance is monitored simultaneously. Changes of the photocurrent up to 0.000003 amperes and sensitivity to changes in the partial pressure of oxygen as small as 10 to the -10th power torr are reported for different temperatures. Gases are desorbed by a time linear increase of temperature from 80K to 600K. The desorption is monitored with a mass spectrometer locked in the investigated mass number. Simultaneous changes of electrical properties are studied using TSC curves. Consequent desorption show, in general, more than one desorption peak, indicating multisite adsorption. (Author)

AD-634 034 **Field 20L, 20F, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Colorado State Univ., Fort Collins. Dept. of Physics.
STUDIES, RESEARCH AND INVESTIGATIONS OF THE OPTICAL PROPERTIES OF THIN FILMS OF METALS SEMI-CONDUCTORS AND DIELECTRICS.
Semi-annual rept. no. 11, 16 Aug 64-15 Feb 65,
by Lawrence N. Hadley. 15 Feb 65, 12p
Contract DA-44-009-eng-3828
See also AD-634 035.

Descriptors: (*Metal films, Optical properties), (*Dielectric films, Optical properties), (*Semiconducting films, Optical properties), Chromium, Reflectivity, X-ray diffraction analysis, Crystal lattices, Titanium compounds, Oxides.

Identifiers: Titanium oxides.

The primary emphasis was further work on films of chromium with hope for an understanding of the reasons for the failure of the method of determining optical constants from measurements of reflectance, transmittance and thickness in the case of chromium. No solution was found, but the investigations yielded some information. X-ray diffraction analysis of Cr films showed a preferred orientation of the Cr on quartz. Only the (110) line of Cr could be observed on the spectrogoniometer. Either this makes Cr lattice spacings fit quartz more closely, or possibly this gives the greatest population density. A Cr film evaporated to a thickness of 1000 A on quartz at 500 C in 1/2 second was found to have a crystallite size of 190 A plus or minus 10 A. An effort was also made to push the measurements of the optical constants of TiO2 out to the IR and UV by use of the curves. The same difficulties in determining n and k occurred as previously. (Author)

AD-634 035 **Field 20L, 20F, 11F**
CFSTI Prices: HC$1.00 MF$0.50
Colorado State Univ., Fort Collins.
STUDIES, RESEARCH AND INVESTIGATIONS OF THE OPTICAL PROPERTIES OF THIN FILMS OF METALS, SEMI-CONDUCTORS AND DIELECTRICS.
Semi-annual rept. no. 12, 15 Feb-15 Aug 65,
by Lawrence N. Hadley. 15 Aug 65, 11p
Contract DA-44-009-ENG-3828
See also AD-409 956.

Descriptors: (*Metal films, Optical properties), (*Dielectric films, Optical properties), (*Semiconducting films, Optical properties), Surfaces, Reflection, Light transmission, Vacuum apparatus, Spectrophotometers, Aluminum Bismuth, Copper, Silver, Mirrors.

MODIFICATION OF THE SHUTTER SYSTEM: The driving motor for the shutter system used in the vacuum system was replaced by a helical spring and the shutter was replaced by a slotted 12-in.-diameter disk. This was done to permit (1) complete preparation of films without breaking the vacuum and (2) deposition times of the order of tenths of seconds or greater. MODIFICATION OF THE BECKMAN DK-2 SPECTROPHOTOMETER: A device was installed in the integrating sphere so that absolute measurements of the reflectance of films could be made. The modification reduces labor in correcting the reflectance curves and minimizes handling of the mirrors. OPTICAL MEASUREMENTS: Attempts were made with various materials to obtain n and k from Hadley's curves ('Transmittance and Reflectance vs. thickness/wavelength for thin film's) and to determine why satisfactory results were not obtained. Values of n and k were obtained at several wavelengths for aluminum, bismuth, and copper but not for silver.

AD-634 044 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Pennsylvania Univ., Philadelphia.
MAGNETO-ACOUSTIC GEOMETRIC RESONANCE STUDY OF BISMUTH UNDER HIGH ql CONDITION.
Technical rept.,
by Yasuji Sawada, and Elias Burstein. Jun 66, 16p
TR-5
Contract Nonr-551 (51)

Descriptors: (*Bismuth, *Magnetic resonance), Acoustics, Atomic energy levels, Band theory of solids, Tensor analysis.

Identifiers: Fermi surfaces.

Magneto-acoustic geometric resonance measurements were carried out to 'caliper' the Fermi surface of bismuth under the condition of ql approx. 100. Attenuation oscillations due to the electron surface were observed for most orientations of the magnetic field. No clear oscillations were observed for the hole surface. The results for the extremum momenta fit an ellipsoidal geometry for the Fermi surfaces within 5 percent. The ratios of the inverse effective mass tensor components deduced from this experiment using an ellipsoidal model are alpha-11/alpha-22 = 78.1, alpha-33/alpha-22 = 43.9, alpha-23/alpha-22 = 5.1. The tilt angle calculated from these values if 6.7 degrees. (Author)

AD-634 061 **Field 20L, 7D, 20C**
CFSTI Prices: HC$1.00 MF$0.50
Lehigh Univ., Bethlehem, Pa.
CONDUCTIVITY OF LITHIUM-SUBSTITUTED TRANSITION METAL OXIDES CONTAINING MAGNESIUM,
by W. C. Hahn Jr. Jun 66, 4p
Contract Nonr-4373 (00)

Descriptors: (*Transition elements, Electrical conductance), (*Magnesium compounds, Oxides), (*Lithium compounds, Oxides), (*Nickel compounds, Oxides), (*Manganese compounds, Oxides), (*Cobalt compounds, Oxides), Temperature, Heat of activation, Solid solutions, Resistance (Electrical).

Identifiers: Neel temperature.

Li (sub x)Ni (1-x)O, Li (sub x)Mn (1-x)O, and Li (sub x)Co (1 -x)O. It is proposed in this investigation to measure the effect on the room temperature specific resistivity of additions of MgO to systems such as LixNi (1-x)O, LixMn (1-x)O, and LixCo (1-x)O. Because the divalent state of magnesium is so stable, it will not enter into the conductivity process directly, but it can be anticipated that it can confer several beneficial results on the conductivity in the above named oxide systems. It is realized that extremely large additions of MgO to any of the systems under consideration, as well as additions of MgO to systems in which the amount of lithium is very small, would serve only to increase the resistivity, but it can be anticipated that a region of compositions may be found in which the resistivity will be decreased. An additional reason for adding MgO, and perhaps ultimately the most important, is that existing theories do not explain the maximum in the activation energy observed at approximately 50% nickel in the system Li (sub 0.08)Ni (sub y)Co (1-0.08-y)O observed by Miller, Heikes and Johnston (J. Chem. Phys. 31:116 (1959)). (Author)

N66-21656 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
Martin Co., Baltimore, Md. Rias Div.
STUDY OF ELECTRON-PHONON INTERACTION IN III-V SEMICONDUCTORS.
Quarterly progress rept. no. 4, 15 Oct 65-15 Jan 66,
by J. Martin. 3 Feb 66, 14p
Contract NAS8-20012
NASA CR-71395

Descriptors: *Semiconductor, *Electron-phonon interaction, *Quartz.

N66-21776 **Field 20L**
CFSTI Prices: HC$2.00 MF$0.50
Field Emission Corp., McMinnville, Oreg.
INVESTIGATIONS OF ELECTRON EMISSION CHARACTERISTICS OF LOW WORK FUNCTION SURFACES.
Quarterly rept. no. 5, 1 Oct-31 Dec 65,
by A. E. Bell, L. W. Swanson, and L. C. Crouser.
Jan 66, 28p
Contract NASw-1082
NASA CR-71539

Descriptors: *Adsorption, *Electron emission, *Magnetic probe, *Cesium, *Tungsten, *Work function.

N66-22249 **Field 20L**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE DIELECTRIC CONSTANT OF THE LEAD SALTS,
by P. H. Fang, and M. M. Sokoloski. 1965, 6p
NASA-TM-X-5650

Descriptors: *Dielectric constant, *Lead compound, *Spectroscopy, *Standing wave ratio.

N66-22359 **Field 20L**
CFSTI Prices: HC$3.00 MF$0.75
General Precision, Inc., Little Falls, N. J.
BEAM ALIGNMENT TECHNIQUES BASED ON THE CURRENT MULTIPLICATION EFFECT IN PHOTOCONDUCTORS. FIRST PHASE.
Technical summary rept.,
by R. P. Borkowski, A. H. Samuel, and D. Grafstein. Apr 66, 72p
Contract NAS12-8
NASA CR-431

Descriptors: *Cadmium sulfide, *Photoconductive cell.

PB-169 886 **Field 20L**
CFSTI Prices: HC$11.60 MF$0.75
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
CONTRIBUTION A L'ETUDE DU COMPORTEMENT MAGNETIQUE IRREVERSIBLE DES SUPRACONDUCTEURS (Concerning the Study of the Irreversible Magnetic Behaviour of Superconductivity).
Doctoral thesis in French,
by Gerard Kuhn. 1965, 116p CEA-R-2808
Text in French; Attached Summary in English.

Descriptors: (*Superconductors, Magnetic properties), (*Superconductivity, Magnetic properties), Crystal lattice defects, Rhenium, Tantalum, Niobium, Thermal conductivity, France.

The influence of the presence of extended lattice defects on the magnetic behaviour has been

studied for the case of type I superconductors, such as Re and Ta, and in a more quantitative manner for the type II superconductor niobium. In this case, measurements of the thermal conductivity have given an estimate of the relative concentration of lattice defects in each specimen. These measurements show that the larger the number of lattice defects, the more irreversible becomes the magnetization curve, and the larger becomes the values of the critical current, which is related by a simple model to the magnetization values. A study by transmission electron microscopy has confirmed on the one hand the diversity of the extended lattice defects and on the other hand has allowed the formulation of several hypothesis on their respective influence. (Author)

AD-402 827 **See Field 9E**

AD-413 473 **See Field 9E**

AD-417 368 **See Field 11B**

AD-441 646 **See Field 17E**

AD-461 567 **See Field 17E**

AD-474 878 **See Field 17E**

AD-633 478 **See Field 9E**

AD-633 764 **See Field 20B**

AD-633 774 **See Field 18D**

AD-633 777 **See Field 9A**

AD-634 050 **See Field 20F**

20M. THERMODYNAMICS

AD-421 814 **Field 20M, 9B**
CFSTI Price: HC$6.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
NUMERICAL APPROXIMATIONS IN HEAT TRANSFER PROBLEMS AND USAGE OF IBM 7090 COMPUTER FOR SOLUTIONS,
by David W. Fox, Harry Shaw Jr., and John Jellinke. 17 May 62, 62p CF-2954
Contract NOrd-7386

Descriptors: (*Heat transfer, Programming (Computers)), (*Programming (Computers), Heat transfer), Models (Simulation), Programming languages, Difference equations, Differential equations, Partial differential equations, Aerodynamic heating, Mathematical models, Numerical analysis.

The purpose of this paper is to furnish information necessary to obtain numerical approximations to the solutions of certain heat transfer problems by making use of a thermal model and related IBM 7090 computer program developed by BBE and BCC. The solutions take the form of a time history of temperature distribution. The problems concern heated structures or components of quite general geometric configuration and material composition. (Author)

AD-633 537 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
APPROXIMATE ANALYTICAL METHODS IN THE THEORY OF RADIATIVE HEAT TRANSFER IN AN ABSORBING MEDIUM,
by Yu. A. Surinov. 20 Jan 66, 15p FTD-TT-65-1467
TT 66-61385
Unedited rough draft trans. of Izvestiya Vysshikh Zavedenii. Fizika (USSR) n3 p19-26 1960

Descriptors: (*Heat transfer, Theory), Approximation (Mathematics), USSR.

This article is concerned with the solution of the problem of radiative heat transfer in a radiating system consisting of a finite number n of uniform and isothermal gray bodies located on the boundary of the system and separated by an absorbing medium consisting of a finite number m of uniform, partially transparent, constant temperature regions (zones). This solution, representing the conclusion of a solving system of algebraic equations for the generalized solving scope of radiation, is the basis for the development of a zonal method to calculate radiative heat transfer in different radiating systems and, in particular, in fire boxes and industrial flame furnaces, and also for a theoretical basis for experimental methods of investigating the processes of radiative heat transfer, connected with the application of both thermal and light modeling of the stated processes. (Author)

AD-633 583 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Redstone Scientific Information Center, Redstone Arsenal, Ala.
HEAT TRANSFER TO LIQUIDS BOILING IN PIPES AND DURING BULK BOILING,
by I. T. Aladiev. 10 Mar 66, 16p RSIC-530
TT 66-61387
Trans. of Teploenergetika (USSR) v10 p57-61 1963.

Descriptors: (*Heat transfer, *Boiling), Pipes, Liquids, Water, Methanols, Ethanols, Benzene, Propanes, Carbon tetrachloride, Alkanes, USSR.

Identifiers: Heptanes, Pentanes.

Proposed is a dimensionless equation for the calculation of heat transfers during effervescent boiling of subcooled water and water-steam mixtures in pipes; and bulk boiling of water, ethyl and methyl alcohol, benzene, n-pentane, n-heptane, propane, and carbon tetrachloride. (Author)

AD-633 659 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
SECOND ALL UNION CONFERENCE ON THERMO-AND MASS EXCHANGE,
by I. T. Elperin, and G. D. Rabinovich. 21 Jan 66, 24p FTD-TT-65-1475
TT 66-61398
Unedited rough draft trans. of InzhenernoFizicheskii Zhurnal (USSR) v7 n10 p130-5 1964.

Descriptors: (*Mass transfer, Symposia), (*Heat transfer, Symposia), USSR, Thermal conductivity.

The purpose of the conference was to evaluate greater theoretical and experimental material on different chapters of thermo-and mass exchange, accumulated during the past three years, and also the selection of basic trends of further investigations.

AD-633 677 **Field 20M, 20D**
CFSTI Prices: HC$3.00 MF$0.50
Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
FUNDAMENTAL RELATIONSHIPS FOR ABLATION AND HYPERTHERMAL HEAT TRANSFER.
Technical rept. (final),
by Robert T. Achard. Apr 66, 54p AFFDL-TR-66-25
Proj. AF-1368,
Task 136804

Descriptors: (*Ablation, Reviews), (*Aerodynamic heating, Reviews), Engineering, Heat transfer, Materials.

A qualitative review of fundamental relationships involved in ablation engineering and aerodynamic heating is presented. This document is written for rapid reading with the primary purpose of introducing the technical area to engineers, scientists, and management personnel associated with but not intimately working in hypervelocity thermal protection. (Author)

AD-633 702 **Field 20M**
CFSTI Prices: HC$5.00 MF$1.00
Pennsylvania State Univ., University Park. Ordnance Research Lab.
TRANSIENT DROPLET GROWTH DURING DROPWISE CONDENSATION.
Technical memo.,
by C. J. Hurst. 27 Apr 66, 158p TM-616.3481-03
Contract NOw-65-0123-d

Descriptors: (*Condensation, Drops), (*Drops, *Heat transfer), Convection (Heat transfer), Mathematical models, Conduction (Heat transfer), Films, Nucleation, Surface properties, Thermal conductivity.

The study investigated the possibility of determining high heat-transfer rates during dropwise condensation by analyzing single condensate droplets growing on a convectively-cooled surface. A mathematical model included both the droplet and a portion of the condensing surface. Experiment utilized condensate droplets, growing on a thin copper surface, to verify the analysis. Experimental results agreed closely with predicted results--indicating high heat-transfer rates at droplet perimeters. Both experiment and analysis showed that no single vapor-to-condensing-surface temperature difference may be expected during dropwise condensation. Limitations on the calculation procedure pertaining to the region around the droplet perimeter restricted the accuracy of heat-transfer rate predictions; a separate study of droplet perimeter is suggested. (Author)

AD-633 713 **Field 20M, 20D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
TEMPERATURE PROFILES IN BODIES TRAVELING AT HIGH ALTITUDES AT HYPERSONIC SPEED,
by I. N. Murzinov. 20 Jan 66, 9p FTD-TT-65-1478
TT 66-61414
Unedited rough draft trans. of Akademiya Nauk SSSR. Izvestiya. Mekhanika i Mashinostroenie, n4 p148-50 1964.

Descriptors: (*Heat transfer, *Aerodynamic configurations), High altitude, Hypersonic characteristics, USSR.

AD-634 068 **Field 20M**
CFSTI Prices: HC$3.00 MF$0.50
Naval Avionics Facility, Indianapolis, Ind.
RESULTS OF HEAT TRANSFER STUDIES PERFORMED ON NAFI STANDARD HARDWARE STYLE 1-A, TYPE 3 MODULES.
Technical rept.,
by Mickey Owen. 10 May 66, 53p NAFI-TR-781
Proj. RREN-04/013/287/1/F008-21/01

Descriptors: (*Heat transfer, Scientific research), Operation, Theory, Design, Circuits, Thermocouples, Convection (Heat transfer), Temperature.

The report investigates the relationships between the actual operating temperatures of NAFI Standard Hardware Type 3 Modules and the theoretical operating temperatures. The theoretical operating temperatures were calculated from standard heat transfer methods. The results point out that the actual and theoretical operating temperatures are sufficiently close that calculated temperatures may be used for preliminary design purposes without introducing significant errors. (Author)

N66-21439 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Texas Univ., Austin. Dept. of Mechanical Engineering.

AN IMPROVED MODEL FOR TWO-DIMENSIONAL TURBULENT BASE FLOW WITH ZERO MASS BLEED.
Summary rept.,
by J. P. Lamb, and C. S. Lenzo. 28 Feb 66, 36p
Contract NAS8-11482
NASA CR-71527

Descriptors: *Mathematical model, *Rocket nozzle, *Turbulent flow, *Two-dimensional flow, *Base flow.

N66-21660 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
Brown Engineering Co., Inc., Huntsville, Ala. Research Labs.
SEPARATED BASE FLOW HEAT TRANSFER ANALYSIS,
by T. F. Greenwood. Nov 65, 36p R-168
Contract NAS8-20169
NASA CR-71409

Descriptors: *Separated flow, *Turbulent flow, *Wedge flow, *Base flow, *Heat transfer, *Supersonic flow.

N66-21694 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
Delaware Univ., Newark.
THE ECKERT REFERENCE FORMULATION APPLIED TO HIGH-SPEED LAMINAR BOUNDARY LAYERS OF NITROGEN AND CARBON DIOXIDE,
by J. P. Hartnett, H. A. Simon, and C. S. Liu. Apr 66, 12p
Grant NsG-356
NASA CR-420

Descriptors: *Carbon dioxide, *Nitrogen, *Approximation method, *Laminar boundary layer.

N66-21781 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Berkeley.
INFRARED RADIATION MEASUREMENTS OF COMBUSTION GASES.
Quarterly progress rept. no. 4, 1 Apr-30 Jun 65,
by M. M. Abu-Romia, C. L. Tien, and W. H. Giedt. 15 Jul 65, 12p
Contract NAS8-11468
NASA CR-71542

Descriptors: *Absorption spectrum, *Carbon dioxide.

N66-21808 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
California Univ., Davis.
INFRARED RADIATION MEASUREMENTS OF COMBUSTION GASES.
Quarterly progress rept. no. 6, 1 Oct-31 Dec 65,
by W. H. Giedt. 1966, 16p
Contract NAS8-11468
NASA CR-71526

Descriptors: *Infrared radiation, *Measuring apparatus, *Propellant combustion.

N66-21825 **Field 20M**
CFSTI Prices: HC$5.00 MF$1.00
Alabama Univ., University. Bureau of Engineering Research.
TRANSIENT HEAT TRANSFER STUDIES.
Final rept.,
by R. M. Hollub. Jan 66, 162p
Contract NAS8-5217
NASA CR-71533

Descriptors: *Gas flow, *Heat-transfer coefficient, *Transient heating.

N66-22256 **Field 20M**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
THE DIRECTIONAL RADIATIVE CHARACTERISTICS OF CONICAL CAVITIES AND THEIR RELATION TO LUNAR PHENOMENA,
by J. R. Howell, and L. G. Polgar. 1965, 15p
NASA-TM-X-52090
Prepared for presentation at the AIAA/ION Astrodyn. Specialists Conference, Monterey, Calif., 16-17 Sep 1965.

Descriptors: *Radiant energy, *Radiation absorption, *Radiative heat transfer, *Circular cone, *Lunar surface.

N66-22261 **Field 20M**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
CALCULATION OF RADIANT HEAT EXCHANGE BY THE MONTE CARLO METHOD,
by J. R. Howell. 1965, 26p NASA-TM-X-52101
Prepared for presentation at the ASME Winter Annual Meeting, Chicago, 7-11 Nov 1965.

Descriptors: *Computer program, *Monte Carlo method, *Energy transfer, *Radiative heat transfer, *Thermal radiation.

AD-450 678 **See Field 7D**

AD-633 489 **See Field 8L**

AD-633 611 **See Field 11B**

AD-633 623 **See Field 19A**

AD-633 665 **See Field 7D**

AD-633 762 **See Field 20D**

PB-169 242 **See Field 13A**

20N. WAVE PROPAGATION

AD-633 652 **Field 20N, 20C**
CFSTI Prices: HC$3.00 MF$0.75
Electrical Engineering Research Lab., Univ. of Texas, Austin.
A FINITE-DIFFERENCE STUDY OF THE EFFECT OF CURRENT AND CHARGE SOURCES ON THE ELECTROMAGNETIC FIELD OF THE EARTH,
by John E. Boehl, and Francis X. Bostick Jr.20 May 66, 70p Rept. no. 143
Contract Nonr-375 (14),
Proj. NR-371-032

Descriptors: (*Electromagnetic fields, Earth), (*Mathematical models, Field theory), Plasma physics, Ultralow frequency, Ionospheric propagation.

A finite-difference approach to the description of the electromagnetic field structure within the region bounded by the earth and some outer spherical boundary is studied. Within this medium, a current sheet and a free charge sheet are assumed to exist in a spherical geometry. The medium is assumed to be two-dimensionally inhomogeneous and to consist of a plasma gas. The earth is considered to be perfectly conducting, and the field distribution at the outer boundary is caused to assume the form of a system of spherical waves which are propagating outwardly. (Author)

AD-633 668 **Field 20N, 20.9**
CFSTI Prices: HC$6.00 MF$1.25
Electrical Engineering Research Lab., Univ. of Texas, Austin.
A STUDY OF THE APPLICATION OF FINITE-DIFFERENCE TECHNIQUES TO ULF WAVES IN A SPHERICAL MODEL INHOMOGENEOUS, ANISOTROPIC, ATMOSPHERIC PLASMA,
by Carroll W. Chapman, and Francis X. Bostick, Jr.15 Apr 66, 247p Rept. no. 141
Contract Nonr-375 (14),
Proj. NR-371-032

Descriptors: (*Mathematical models, *Ionospheric propagation), (*Plasma physics, Ionospheric propagation), Ultralow frequency.

A finite-difference analog is formulated for the linearized equations which govern the propagation of ULF waves in the ionized terrestrial atmospheric medium. The formulation is carried out in a spherical coordinate system. The model of the medium consists of a static magnetic dipole centered in a perfectly conducting spherical earth which is surrounded by a plasma. Numerical results are presented and discussed for various special cases. (Author)

AD-633 696 **Field 20N, 17B**
CFSTI Prices: HC$3.00 MF$0.75
Naval Research Lab., Washington, D. C.
RESULTS OF AIRBORNE FIELD MEASUREMENTS IN THE ANTIPODAL REGION OF RADIO STATION NPM, HAWAII,
by J. E. Rogerson. 26 Apr 66, 38p NRL-6373
Proj. SR-008-01-01,
Task 7044

Descriptors: (*Radio waves, Propagation), (*Radio signals, Focusing), (*Radio fields, Measurement), Very low frequency, Ionospheric propagation, Radio transmission, Marine meteorology, Multipath transmission, Airborne, Radio equipment, Communication systems, Naval research.

Identifiers: Antipodal points.

The U. S. Naval Research Laboratory is conducting a comprehensive investigation of very-low-frequency (vlf) radio wave propagation. The objective of this investigation is to determine the parameters necessary for predicting the reliability of vlf communications in the ocean areas of the world. It is believed that an investigation of the electromagnetic fields at and near the antipode of a vlf transmitter would provide much propagation information. Since all the antipodes of the Navy vlf transmitter stations, except for station NPM in Hawaii, are located in remote ocean areas, this makes them operationally difficult to investigate, especially with respect to navigation. The NPM antipode, however, is located on land near Ghanzi, Bechuanaland Protectorate, in the Kalahari Desert in southern Africa. Navigation in the vicinity of the NPM antipode could conceivably be more precise than in other antipodal areas. An analysis of the data obtained in July 1963 by the Naval Research Laboratory via aircraft flights in the vicinity of the antipode of radio station NPM, Hawaii (19.8-kHz transmitter) is presented. Definite evidence of convergence of field strengths was found, as expected; a peak value of 2.0 mv/m for the field was measured during the experiment. Indications of in inverse square root dependence on distance for the field strength were observed. The expected diurnal pattern of highest field strengths at local sunrise, lowest fields at local sunset, and intermediate fields at local noon and midnight was found to be true. (Author)

AD-633 893 **Field 20N, 12B**
CFSTI Prices: HC$1.00 MF$0.50
Navy Electronics Lab., San Diego, Calif.
SELECTION OF OPERATIONAL MODES IN HF PROPAGATION PREDICTION.
Research and development rept. Apr 64-Apr 65,
by D. B. Sailors. 25 Mar 66, 27p NEL-1364
Proj. SS-261-001,
Task 7429

Descriptors: (*Radio waves, Propagation), (*Mathematical prediction, Ionospheric propagation), high frequency, Signal-to-noise ratio.

Criteria are given for selecting the operational skywave modes in hf propagation prediction for which the S/N ratio is to be calculated. Only wave reflected from the F2 layer or the E layer are considered: paths having reflections from both these

layers are not considered. In the critical frequency calculations the number of control points varies with path length; the maximum number is five. The program on which this study was based was written in NELIAC 5M for the CDC 1604; it is presented in AD-633 716. (Author)

AD-634 038 **Field 20N, 20C, 20I**
CFSTI Prices: HC$2.00 MF$0.50
Brown Univ., Providence, R. I. Div. of Engineering.
STUDY OF RADIATION AND PROPAGATION OF ELECTROMAGNETIC WAVES.
Final rept. 15 Jan 63-15 Jan 66,
by D. M. Bolle. Mar 66, 29p AF-2498/9
Contract AF 19 (628)-2498,
Proj. AF-5635,
Task 563503
AFCRL 66-277

Descriptors: (*Electromagnetic waves, Propagation), Field theory, Diffraction, Plasma physics, Waveguides, Ionospheric propagation.

The work carried out under the contract is described under the following headings: Scattering, Diffraction and Radiation, Interaction of Fields and Plasmas, Propagation through Inhomogeneous Media, Propagation through Anisotropic Media. (Author)

AD-634 070 **Field 20N, 20C, 20F**
CFSTI Prices: HC$10.50 MF$3.00
Lockheed Missiles and Space Co., Sunnyvale, Calif.
NUMERICAL INVESTGATION OF ELECTROMAGNETIC SCATTERING AND DIFFRACTION BY CONVEX OBJECTS.
Final rept. 16 Nov 64-15 Nov 65,
by Nelson A. Logan. Dec 65, 708p
Contract AF 19 (628)-4393,
Proj. AF-4600,
Task 460004
AFCRL 66-153

Descriptors: (*Electromagnetic waves, Diffraction), (*Diffraction, *Convex bodies), Scattering, Electromagnetism, Mathematical models, Partial differential equations, Numerical analysis, Programming (Computers).

Identifiers: FORTRAN.

The solutions D (x,y,y sub o,q) of the partial differential equation D sub yy + iDx + yD = O are employed as a mathematical model for the fields reflected from and diffracted around an opaque convex surface. This solution involves the Airy function w sub 1 (t) which is a solution of w' sub 1 (t) tw sub 1 (t) = O. FORTRAN computer programs and tables are given for the appropriate Airy functions. Representations for the roots of the equation w' sub 1 (ts) - qw sub 1 (ts) = O which play a fundamental role in the theory are discussed. As a function of q, these roots satisfy the Riccati equation (t - q squared) (dt/dq) = 1. The Riccati equation is used to develop several representations for these roots. FORTRAN programs are presented for the evaluation of these constants. Tables of the roots are given for certain cases which have been shown to be of practical significance. Asymptotic expansions are developed for the height gain function F (y) which is a solution of F'' (y) + (k squared f (y) - lambda s)F (y) = O. The theory of representing functions by a series of Chebyshev polynomials is reviewed and a discussion is given of the significance of these expansions for future work in diffraction theory. (Author)

AD-634 083 **Field 20N, 20I**
CFSTI Prices: HC$3.00 MF$0.75
Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
TRANSIENT SIGNAL PROPAGATION IN LOSSLESS, ISOTROPIC PLASMAS. VOLUME I.
Physical sciences research papers. (Interim scientific rept.),
by Richard E. Haskell, and Carl T. Case. Apr 66, 56p AFCRL-PSRP-212, AFCRL-66-234
Proj. AF-4642
Task 464204

Descriptors: (*Transients, Wave transmission), (*Electromagnetic pulses, Propagation), (*Wave transmission, *Plasma physics), Electromagnetism, Mathematical analysis.

The concept of the wave packet is used to obtain some general results on the propagation of signals in dispersive media. The dispersion of a Gaussian carrier pulse and a square wave carrier pulse in an isotropic plasma is carried out using the wave packet concept. A general analysis of transient wave propagation in isotropic plasmas is given using Laplace transform methods. Solutions are given in terms of series solutions which may be expressed in terms of Lommel functions. Integral solutions which can be easily evaluated numerically are derived using the convolution theorem and using contour integration techniques. The solutions are useful for short dispersion lengths. (Author)

N66-21648 **Field 20N**
CFSTI Prices: HC$2.00 MF$0.50
Alabama Univ. Research Inst., Huntsville.
SCATTERING FROM BODIES OF REVOLUTION BY POINT-MATCHING,
by H. Y. Yee. Dec 65, 33p UARI-31
Grant NsG-381
NASA CR-71390

Descriptors: *Acoustic scattering, *Body of revolution, *Plane wave, *Point matching method, *Wave scattering.

AD-296 044 **See Field 20I**

AD-406 109 **See Field 9E**

AD-433 714 **See Field 17I**

AD-633 521 **See Field 9A**

AD-633 540 **See Field 17I**

AD-633 653 **See Field 20I**

AD-633 716 **See Field 9B**

AD-633 859 **See Field 9E**

NBS-TN-18-24 **See Field 4A**

NBS-TN-18-25 **See Field 4A**

21A. AIR-BREATHING ENGINES

PB-169 547 **See Field 21E**

21B. COMBUSTION AND IGNITION

AD-458 854 **Field 21B, 21I, 19A**
CFSTI Price: HC$6.00
Aerojet-General Corp., Sacramento, Calif.
INVESTIGATIONS OF THE MECHANISMS OF DECOMPOSITION, COMBUSTION, AND DETONATION OF SOLIDS.
Final rept. Mar 64-Feb 65,
by F. J. Cheselske. 15 Mar 65, 240p Rept. no. 0372-01F
Contract AF 49 (638)-851, ARPA Order-24-60,
Projs. OSR-9750,4759,
Task 37501

Descriptors: (*Solid rocket propellants, Combustion), (*Decomposition, Solids), (*Combustion, Solids), (*Detonations, Solids), Explosive materials, TNT, RDX, Reaction kinetics, Ammonium compounds, Halides, Perchloric acid, Pyrolysis, Sublimation, Ammonia, Jet flames, Single cyrstals, Deflagration, Oxygen, Chlorine, Nitrogen compounds, Oxides.

The report summarizes the results of research on the mechanisms of decomposition, detonation and combustion os solids. Extensive kinetic studies were made on (1) linear surface regression rates of solid high explosives (TNT, RDX, etc.), (2) sublimation of ammonium halides, (3) thermal decomposition of anhydrous perchloric acid, and (4) apparent flame strength measurements on NH3 with O2, C12, NO and N2O in the opposed-jet diffusion flame reactor. Preliminary phenomenological studies were carried out n the decomposition of pure or nearly pure single crystals of ammonium perchlorate. Theoretical studies were made on reactions in opposed-jet diffusion flames. New models were developed to explain extinction phenomena in solid rocket motors and a low pressure deflagration limit. (Author)

AD-633 681 **Field 21B, 7D, 19D**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
REPORTS OF THE ACADEMY OF SCIENCES OF THE USSR. (SELECTED ARTICLES).
17 Feb 66, 21p FTD-TT-65-1002
TT 66-61407
Unedited rough draft trans. of Akademiya Nauk SSSR. Doklady v161 n5 p1118-20, 1152-5 1965.

Descriptors: (*Methane, Oxidation), (*Nitroglyceryn, *Detonations), Shock waves, Chemical reactions, Reaction kinetics, Ignition, High-temperature research, Combustion, Explosions, Detonation waves, Propagation, USSR.

Contents: On the mechanism of high temperature methane oxidation in shock waves, by V. V. Voyevodskiy and R. I. Soloukhin; Detonation of nitroglycerin with small velocities, by I. M. Voskoboynikov, A. V. Dubovik, and V. K. Bobolev.

AD-633 977 **Field 21B**
CFSTI Prices: HC$3.00 MF$0.75
General Applied Science Labs., Inc. Westbury, N. Y.
SUPERSONIC COMBUSTION IN PREMIXED HYDROCARBON-AIR FLOW.
Final rept.,
by J. Tamagno, I. Fruchtman, and S. Slutsky. May 66, 64p TR-602
Contract AF 49 (638)-1503

Descriptors: (*Combustion, *Supersonic flow), (*Ignition, Hydrocarbons), (*Flame propagation, Hydrocarbons), (*Hydrocarbons, Combustion), Fuels, Methane, Alkanes, Ethylenes, Propanes, Air, Mixtures, Hydrogen, Temperature, Axially symmetric flow.

Identifiers: Ethanes.

A study of the mechanisms of ignition and flame propagation of supersonic air-hydrogen fuel mixtures at temperatures below the published autoignition limits was made. The hydrocarbons considered were: methane (CH4), ethane (C2H6), ethylene (C2H4) and propane (C3H8) with flame ignition and stabilization by means of a small hydrogen-oxygen pilot flame. Flame speeds for methane, ethane, and ethylene-air mixtures were found to be: four, three and two times smaller, respectively than hydrogen-air flame speeds under similar flow conditions. The dependence of the flame speed on the initial mixture temperature was correlated by a simple exponential relation. Addition of a small amount of hydrogen to a methane-air mixture resulted in doubling the observed flame angle. Finally, measurements of flame temperature distribution and spreading rate were shown to be in

agreement with results of a theoretical analysis incorporating finite rate methane-air chemistry and axisymmetric diffusive flow. (Author)

AD-290 302 See Field 21H

AD-633 619 See Field 7D

AD-633 709 See Field 13L

21C. ELECTRIC PROPULSION

N66-22244 Field 21C
CFSTI Prices: HC$3.00 MF$0.75
General Dynamics/Astronautics, San Diego, Calif. Space Science Lab.
THE USE OF A COAXIAL GUN FOR PLASMA PROPULSION.
Final rept.,
by T. Gooding, R. H. Lovberg, and B. Hayworth.
15 May 62, 93p AE62-0678
Contract NAS5-1139
NASA CR-64213

Descriptors: *Magnetohydrodynamic acceleration, *Plasma propulsion, *Coaxial accelerator.

21D. FUELS

AD-633 632 Field 21D, 21G
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley. Thermal Systems Div.
PERFORMANCE OF ANHYDROUS AMMONIA AS A SPARK IGNITION ENGINE FUEL.
Technical rept.,
by D. S. Smith, and E. S. Starkman. Feb 66, 63p
TR-6, TS-66-2
Contract DA-04-200-AMC-791 (X)
See also AD-624 565.

Descriptors: (*Ammonia, Fuels), (*Fuels, Internal combustion engines), Performance (Engineering), Sparks ignition, Experimental data, Power, Fuel consumption, Effectiveness, Graphics.

Identifiers: Anhydrous ammonia.

Ammonia can be used successfully as a spark ignition engine fuel and at presently existing compression ratios, if introduced as a vapor and if first partly dissociated to hydrogen and nitrogen. Under such circumstances little engine modification is necessary other than a means for flow control of the ammonia and adjustment of the spark timing. Maximum experimental power output for ammonia was 72 per cent of that for iso-octane. This result compares favorably with a theoretically predicted output, when adjusted for 5 per cent hydrogen dissociation, of 75 per cent. Specific fuel consumption using ammonia is increased by a factor of 2 over that of hydrocarbon when compared at peak power and 2-1/2 times when compared at maximum economy. Hydrogen concentration in the fuel feed is a critical factor for successful operation on ammonia as fuel. Minimum concentrations appear to be 4 to 5 per cent by weight at intermediate engine speeds of 1800 rpm. Engine performance rapidly falls if less than minimum concentrations of hydrogen are used. This seems to relate to the self-generating character of the ammonia decomposition during the compression and combustion processes. Performance factors such as are influenced by engine speed, spark timing and manifold pressure are not far different with ammonia than with hydrocarbons as long as minimum amounts of hydrogen are inducted as a part of the fuel flow. (Author)

AD-633 633 Field 21D, 21E
CFSTI Prices: HC$3.00 MF$0.75
California Univ., Berkeley. Thermal Systems Div.
CALCULATION OF ENGINE PERFORMANCE USING AMMONIA FUEL. III. BRAYTON CYCLE.
Technical rept.,
by Henry K. Newhall. Dec 65, 80p TR-4, TS-65-6
Contract DA-04-200-AMC-791 (X)
See also AD-624 565.

Descriptors: (*Ammonia, Fuels), (*Fuels, Gas turbines), Performance (Engineering), Mathematical prediction, Power, Effectiveness, Fuel consumption, Thermal properties, Graphics.

The performance of ammonia as a fuel for gas turbine application was theoretically predicted. Regenerative and non-regenerative Brayton cycles were employed as theoretical models, and combustion products were treated as a chemical equilibrium reactive system. All calculations were carried out by programs developed for use on an IBM 7094 digital computer. The following conclusions are based upon the theoretically predicted results: (1) Ammonia can yield power output up to 10% greater than that for hydrocarbon fuels operating under the same conditions of limited turbine inlet temperature. (2) Thermal efficiencies for ammonia should range up to 10% higher than those for hydrocarbon fuels. (3) Specific fuel consumption for ammonia is predicted to exceed by 2-1/2 to 3 times that for hydrocarbon fuels. (Author)

AD-633 849 Field 21D, 13J
CFSTI Prices: HC$1.00 MF$0.50
Department of the Navy, Washington, D. C.
THE USE OF AMMONIA AS A NEUTRALIZING AGENT IN MARINE DIESELS OPERATING ON SOUR FUEL,
by Yu. M. Akivis, G. N. Kharin, and A. M. Stepanov. 1966, 5p Translation-2181
TT 66-61428
Primenenie Ammiaka v Kachestve Neitralizushchego Veshchestva v Sodovykh Dizelyakh, Rabotaiushchikh na Sernistom Toplive, trans. of Khimiya i Tekhnologiya Topliv i Masel (USSR) v9 n4 p49-50 1964.

Descriptors: (*Fuel oil, Fuel additives), (*Ammonia, Fuel additives), Marine propulsion, Sulfur, Diesel engines, Wear resistance, USSR, Shipborne, Performance (Engineering).

When diesel engines operate on sour diesel fuel, there is increased cylinder and piston wear and an increase in carbon and lacquer deposit. A basic method of overcoming the harmful effects of sulfur contained in diesel fuel is to apply additives to the fuel and oil. Test runs were made on cylinder and piston ring wear, as well as the weight of carbon deposits on the bottoms of the pistons and on the cylinder heads. It was established that total wear on the outer cylindrical surface of all rings was 1.2-1.8 times less for cylinders operating with an ammonia additive. The weight of carbon deposits on the bottoms of the pistons operating on ammonia was 10-20% less than without ammonia. In this case, the carbon deposits on parts of cylinders operating on ammonia were not as dense and constituted a porous, flaky mass, while carbon deposits on parts of cylinders which did not receive an injection of ammonia were dense and fine-grained.

AD-633 765 See Field 20D

AD-633 936 See Field 13J

AD-634 102 See Field 21E

AD-634 115 See Field 13F

21E. JET AND GAS TURBINE ENGINES

AD-634 102 Field 21E, 21D
CFSTI Prices: HC$6.00 MF$1.25
Garrett Corp., Phoenix, Ariz. AiResearch Mfg. Div.
SUMMARIZING CONTROL SYSTEM DEVELOPMENT CONTAMINATED-FUEL PROGRAM.
Phase rept.
26 May 66, 245p CA-5224-R
Contract NOw-63-0790-ci

Descriptors: (*Control systems, *Fuels), Fuel contamination, Turboprop engines.

AD-634 104 Field 21E
CFSTI Prices: HC$4.00 MF$1.00
General Electric Co., Cincinnati, Ohio. Flight Propulsion Div.
LF-2 LIGHTWEIGHT LIFT FAN FRONT FRAME DESIGN.
Final rept.
May 66, 106p
Contract DA-44-177-AMC-45 (T)
Task 1M121401D14409
USAAVLABS TR-66-12

Descriptors: (*Turbines, *Fans), Lift, Design, Flight, Costs, Turbine parts, Weight.

The design, the manufacturing problems and their solutions, and the limited testing of a new bolted component assembled lightweight front frame for a tip turbine lift fan are discussed. This new frame was necessary for compatibility with a new lightweight improved critical speed response rotor design and to replace the present X353-5B front frame which is used in the General Electric Company's XV-5A Lift Fan Flight Research Program with a lighter weight and lower cost unit. The functions, description, design considerations, and stresses are discussed for each component. The frame component weights as calculated have been tabulated, and a comparison of the summation of the component calculated weights of 99.6 pounds versus the actual pan weight of 103 pounds is discussed. The frame was tested to 100-percent rotor speed loading as a component part of the LF-2 lift fan assembly. Limited operating data were obtained because of test termination resulting from turbine bucket shroud damage. (Author)

PB-169 547 Field 21E, 21A
CFSTI Prices: HC$18.00 MF$1.00
Williams Research Corp., Walled Lake, Mich.
APPLICATION OF EXTENDED PLUG NOZZEL NOISE SUPPRESSION THEORY TO A SMALL TURBOJET ENGINE.
Final technical rept.,
by H. B. Moore, and J. M. Clinch. 7 Aug 65, 184p

Contract FA-64-WA-5062.
Proj. WRC-132-G
FAA ADS-56

Descriptors: (*Turbojet engines, Jet engine noise), (*Turbojet exhaust nozzles, Design), (*Jet engine noise, Reduction), Effectiveness, Thrust, Damping.

The effectiveness of extended plug nozzles in reducing jet engine exhaust noise was investigated on small scale hot and cold nozzles and on a small turbojet engine (WR2-2). The investigation included: (1) Optimization of geometry for the small nozzles on the basis of noise reduction vs thrust loss which provided the criteria for design of the nozzles tested on the engine. (2) Engine noise and thrust tests with a conventional thrust nozzle and extended plug nozzles on the WR2-2 engine under simulated fanjet as well as pure turbojet operation. (3) Attempts to correlate small scale cold flow noise measurements with engine noise data. (4) Attempts to explain observed noise reductions on a theoretical basis. (Author)

AD-407 437 See Field 1C

AD-462 148 See Field 11J

AD-474 778 See Field 20A

AD-474 779 See Field 20A

AD-475 662 See Field 20A

AD-633 633 See Field 21D

AD-634 110 See Field 13J

21G. RECIPROCATING ENGINES

AD-633 632 **See Field 21D**

21H. ROCKET MOTORS AND ENGINES

AD-290 302 **Field 21H, 21B**
CFSTI Price: HC$4.60
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
TASK R.
Quarterly progress rept. no. 14, 1 Jul-30 Sep 62. 30 Sep 62, 46p TG-331-14
Contract NOw-62-0604-c, ARPA Order-22-62

Descriptors: (*Rocket motor nozzles, Reaction kinetics), (*Thermal conductivity, Rocket motors), (*Fluid mechanics, Rocket motors), Spectrum analyzers, Flames, Exhaust gases, Combustion.

Contents: High temperature chemical kinetics; Thermal conductivity of gases; Rocket nozzle fluid dynamics; Rocket nozzle chemical kinetics.

N66-21436 **Field 21H**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
DEVELOPMENT OF THE RANGER BLOCK III SPACECRAFT PROPULSION SYSTEM,
by D. D. Evans, R. F. Mattson, and T. A. Groudle. 15 Mar 66, 52p JPL-TR-32-829
Contract NAS7-100
NASA CR-71515

Descriptors: *Propulsion system, *Spacecraft design, *Ranger block III.

N66-21867 **Field 21H**
CFSTI Prices: HC$3.00 MF$0.75
Pratt and Whitney Aircraft, West Palm Beach, Fla. Research and Development Center.
INVESTIGATION OF PRESSURE PREDICATION METHODS FOR LOW FLOW RADIAL IMPELLERS. PHASE III.
Final rept. for Jun 63-Feb 66,
by H. F. Hue, and W. E. Young. 4 Feb 66, 78p
PWA-FR-1716
Contract NAS8-5442
NASA CR-71637

Descriptors: *Computer program, *Impeller, *Prediction theory, *Pressure measurement, *Fortran.

N66-22268 **Field 21H**
CFSTI Prices: HC$3.00 MF$0.75
Liquid Rocket Operations, Aerojet-General Corp., Sacramento, Calif.
AERODYNAMIC DESIGN - MODEL II TURBINE M-1 FUEL TURBOPUMP ASSEMBLY,
by T. W. Reynolds. 15 Apr 66, 74p AGC-8800-52
Contract NAS3-2555
NASA CR-54820

Descriptors: *Aerodynamics, *Liquid hydrogen, *Turbopump, *Two-stage turbine, *M-1 rocket engine.

N66-22352 **Field 21H**
CFSTI Prices: HC$7.46 MF$2.25
Lockheed-California Co., Burbank.
A TRANSIENT HEAT TRANSFER AND THERMODYNAMIC ANALYSIS OF THE APOLLO SERVICE MODULE PROPULSION SYSTEM. VOL. I. PHASE I. TRANSIENT THERMAL ANALYSIS.
Final rept., 28 Jul 64-28 Jul 65,
by H. R. Holmes, B. A. Nevelli, I. Shuldiner, M. A. Kazarian, and H. D. Schultz. 10 Aug 65, 446p LR-18899-Vol-I
Contract NAS9-3349
NASA CR-65331

Descriptors: *Fuel cell, *Apollo spacecraft, *Thermodynamic property, *Transient heating.

N66-22353 **Field 21H**
CFSTI Prices: HC$7.00 MF$1.75
Lockheed-California Co., Burbank.
A TRANSIENT HEAT TRANSFER AND THERMODYNAMIC ANALYSIS OF THE APOLLO SERVICE MODULE PROPULSION SYSTEM. VOL. II. PHASE II. THERMAL TEST PROGRAM.
Final rept., 28 Jul 64-28 Jul 65,
by K. J. Kahn, H. H. Ogimachi, M. A. Kazarian, and P. S. Starrett. 10 Aug 65, 347p LR-18899-Vol-2
Contract NAS9-3349
NASA CR-65332

Descriptors: *Apollo spacecraft, *Heat transfer, *Thermal simulation.

N66-22369 **Field 21H**
CFSTI Prices: HC$4.00 MF$0.75
Martin Co., Denver, Colo.
PRESSURIZATION SYSTEM FOR USE IN THE APOLLO SERVICE PROPULSION SYSTEM. PHASE I.
Interim rept.,
by D. N. Gorman, and G. R. Page. Jul 65, 103p CR-65-50
Contract NAS9-3521
NASA CR-65314

Descriptors: *Apollo project, *Pressurization, *Propulsion system.

PB-169 980 **Field 21H, 11F**
CFSTI Price: HC$1.10
Stanford Research Inst., Menlo Park, Calif.
TUNGSTEN AND ROCKET MOTORS.
Progress rept. no. 12 1 Aug-30 Nov 60.
3 Jan 61, 7p
Contract NOrd-18619 (FBM),
Proj. SR1-SU-2785,
AD 248 727

Descriptors: (*Tungsten, Rocket motors (Solid propellant)), (*Rocket motors (Solid propellant), Tungsten), Chemical reactions, Exhaust gases.

This study is concerned with the interactions between tungsten and the exhaust constituents from solid-propellant rocket motors, where tungsten is used for such components as nozzle liners and jetevators. Since the solid propellants containing aluminum are of greatest current interest, the reactions between tungsten and molten alumina constitute a most important part of the investigation.

21I. ROCKET PROPELLANTS

N66-21695 **Field 21I**
CFSTI Prices: HC$3.00 MF$0.75
Bendix Corp., Southfield, Mich.
RESEARCH STUDY OF THE VORTEX VALVE FOR MEDIUM-TEMPERATURE SOLID PROPELLANTS,
by W. D. Holt, and J. G. Rivard. Apr 66, 81p
Contract NAS1-4158
NASA CR-424

Descriptors: *Solid propellant, *Vortex flow, *Control valve, *Gas generator, *Throttling.

N66-22197 **Field 21I**
CFSTI Prices: HC$2.00 MF$0.50
Stanford Research Inst., Menlo Park, Calif.
PROPELLANT COMBUSTION PHENOMENON DURING RAPID DEPRESSURIZATION.
Quarterly rept. no. 1, 1 Jul-30 Sep 65,
by E. L. Capener, G. A. Marxman, and L. A. Dickinson. 12 Oct 65, 36p
Contract NAS7-389
NASA CR-71758

Descriptors: *Propellant combustion, *Solid propellant.

AD-458 854 **See Field 21B**

AD-465 146 **See Field 7C**

22. SPACE TECHNOLOGY

N66-22262 **Field 22**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DESIGN CRITERIA FOR INFLATED, EXPANDABLE BEAMS USED AS STRUCTURAL MEMBERS IN AN ADVANCED CONCEPT PARAGLIDER,
by J. F. McNulty, and R. A. Toni. 1965, 20p
NASA-TM-X-56353
Prepared for presentation at the Aerospace Expandable Structure Conference (2nd), Minneapolis, 25-27 May 1965.

Descriptors: *Aerodynamic load, *Inflatable structure, *Expandable structure, *Paraglider, *Structural beam.

N66-22329 **Field 22**
CFSTI Prices: HC$4.00 MF$1.00
National Aeronautics and Space Administration, Huntsville, Ala. Marshall Space Flight Center.
AERO-ASTRODYNAMICS RESEARCH ARCH REVIEW NO. 3, JANUARY 1 - JUNE 30, 1965,
by S. Hightower, and W. D. Murphree. 15 Oct 65, 126p NASA-TM-X-53389

Descriptors: *Aerothermodynamics, *Base heating, *Guidance + control, *Spacecraft instrumentation, *Structural dynamics, *Aerodynamics.

22A. ASTRONAUTICS

AD-633 667 **Field 22A, 22C, 17H**
CFSTI Prices: HC$3.00 MF$0.75
Foreign Technology Div., Wright-Patterson AFB, Ohio.
BULLETIN OF STATIONS OF OPTICAL OBSERVATION OF ARTIFICIAL EARTH SATELLITES.
13 Jan 66, 57p FTD-MT-64-532
TT 66-61405
Edited machine trans. of Byulleten Stantsii Opticheskogo Nablyudeniya Iskusstvennykh Sputnikov Zemli (USSR) n35 34p 1963.

Descriptors: (*Satellite networks, *Optical tracking), (*Satellites (Artificial), Orbital trajectories), Visual perception, Spacecraft, USSR, Photographic techniques.

Contents: Evaluating the accuracy of visual observation of stations of the USSR from data of observations of satellite 1960 epsilon 3 in 1961, by M. A. Lur'ye and N. L. Shkol'nikova; Method of visual observations of artificial earth satellites at the satellite observation station of Chernovitskiy University, by V. M. Kondratenko and Ye. A. Pavlyniv; Individual differences during observation of satellites, by V. Merkushev; Method of visual observation of artificial earth satellites at the Yerevan Station, by B. Ye. Tumanyan; Experience of photographing satellites by a NAFA-21 camera, by V. A. Merkushev; About increased accuracy of processing photographs of artificial earth satellites, obtained with a small camera, by A. L. Chikarenko and S. A. Filipcheva; On the evolution of orbits of artificial earth satellites in connection with solar activity, by N. P. Slovokhotova; Preliminary average orbital elements of the cabin of the

first Soviet space ship (1960 epsilon 3) for October-December 1962, by G. A. Chebotarev and Ye. N. Makarova; Preliminary orbital elements of Soviet artificial earth satellite Cosmos 8 (1962 alpha xi 1) and its rocket-carrier (1962 alpha xi 2), by G. A. Chebotarev and Ye. N. Makarova.

AD-633 953 **Field 22A, 3A**
CFSTI Prices: HC$1.00 MF$0.50
Rand Corp., Santa Monica, Calif.
ASTRONOMY FROM THE MOON: A LOGISTIC APPRAISAL,
by R. C. Moore, and G. F. Schilling. Jun 66, 11p P-3377

Descriptors: (*Lunar bases Logistics), (*Moon, Lunar bases), (*Astronomical observatories, Lunar bases), Space probes, Feasibility studies, Astronautics.

A methodolgy is available for quantitatively evaluating the implications of superimposing scientific requirements on an existing or planned supply support system for space operations. For one application, a detailed scenario was prepared for an astronomical research program that culminates in the establishment of a lunar-based observatory. The scientific requirements of this scenario were then added to the basic requirements for the construction and operation of a manned lunar base over an eight-year period. The numerical results indicate that such a research program is logistically feasible and could be conducted during the next decades. Further analysis suggests that future scientific space missions, in other disciplines as well as in astronomy, can fruitfully be planned in terms of weights and dimensions orders of magnitude larger than those of today. (Author)

AD-633 962 **Field 22A, 3B**
CFSTI Prices: HC$2.00 MF$0.50
Aerospace Technology Div., Library of Congress, Washington, D. C.
SOVIET LONG-RANGE SPACE-EXPLORATION PROGRAM: ANALYTICAL SURVEY.
Pt. 2, rept. B on ATD work assignment no. 57,
by Vladimir E. Mutschall. 16 Feb 66, 36p ATD-66-18
TT 66-61443
Based on Soviet open sources pub. 1956-65. Rept. on Surveys of Communist World Scientific and Technical Literature.

Descriptors: (*Moon, Lunar probes), (*Lunar probes, USSR), (*Astronautics, USSR), Research program administration, Astrophysics, Space probes, State-of-the-art reviews.

This analytical survey is based on Soviet open sources published 1956-1965. It is one of a series of reports dealing with the Soviet long-range space-exploration program and is concerned, in particular, with lunar surface research. Information not directly related to this subject has been included because of its broad implications for study in this field. This report may prove useful to lunar mission planners, both those concerned with the purely scientific aspects of the moon's surface and immediate subsurface and those involved in the development of lunar exploration vehicles and in the establishment of permanent lunar bases. Information is divided as follows: Photometric observations; spectral observations; measurement of lunar temperatures; the meteor slag theory; interpretation of lunar craters; lunar seismicity; radio echo studies; lunar atmosphere. The main purpose of this report is to present an up-to-date summary of the current state of Soviet knowledge concerning the surface of the moon. The question of lunar topography is of obvious importance to the landing of instrument packages and manned vehicles on the moon. Every major aspect of the current lunar research program has been considered and all pertinent evidence available from Soviet sources has been reviewed. Much Soviet effort in lunar studies has been directed toward the problems which will have to be solved in order to ensure a tolerable margin of safety for the astronauts who will be going there.

AD-634 085 **Field 22A, 22B**
CFSTI Prices: HC$2.00 MF$0.50
RAND Corp., Santa Monica, Calif.
PROCEDURES FOR ESTIMATING THE RESOURCE REQUIREMENTS OF MANNED SPACE FLIGHTS,
by Joseph String. Jun 66, 30p P-3382
Prepared for presentation at Spring Meeting of JSCOMRAM, Boston, 27 Apr 66.

Descriptors: (*Space flight, Management planning), Costs, Programming (Computers), Launching, Lunar trajectories, Orbital trajectories, Manned spacecraft, Logistics.

The paper is addressed to three principal topics: (1) what a typical manned space flight plan looks like; (2) procedures employed in evaluating the resource impace of alternative space flight proposals, either projects or plans; (3) the resource implications of some of the major types of activities currently being considered in NASA's longrange planning.

N66-21766 **Field 22A**
CFSTI Prices: HC$5.00 MF$1.00
System Sciences Corp., Falls Church, Va.
GEOS. A READINESS TEST EVALUATION REPORT,
by H. G. Gross. Feb 66, 165p Technical memo. TM-4007-4
Contract NASw-1238
NASA CR-71623

Descriptors: *Electronic, *Geodetic satellite, *Optical.

N66-22348 **Field 22A**
CFSTI Prices: HC$4.00 MF$1.00
Franklin Inst. Research Labs., Philadelphia, Pa.
STUDY OF DESIGN PARAMETERS OF EXPLOSIVE INITIATORS WITH RESPECT TO SPACE ENVIRONMENTS.
Final rept.,
by R. G. Amicone, and P. F. Mohrbach. Dec 65, 122p F-B2333
Contract NAS9-4042
NASA CR-65325

Descriptors: *Explosive, *Environment, *Hazard, *Ignition system, *Manned space flight.

N66-22376 **Field 22A**
CFSTI Prices: HC$7.00 MF$3.00
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
A STUDY OF JUPITER FLYBY MISSIONS.
Mid-term technical rept.
17 Feb 66, 379p Rept. no. JPL-951285
Contract NAS7-100
NASA CR-71844
Prepared in cooperation with General Dynamics, Fort Worth, Tex., Rept. no. FZM-4572.

Descriptors: *Flyby mission, *Jupiter project, *Spacecraft design.

AD-633 580 **See Field 20D**

AD-633 622 **See Field 14B**

AD-633 784 **See Field 3B**

AD-633 999 **See Field 3B**

AD-634 113 **See Field 6S**

22B. SPACECRAFT

AD-633 996 **Field 22B, 18I, 3B**
CFSTI Prices: HC$1.10 MF$0.50
RAND Corp., Santa Monica, Calif.
METEOROID HAZARD TO NUCLEAR POWER STATIONS IN SPACE,
by R. L. Bjork. 21 Dec 60, 16p P-2172
Prepared for publication in nucleonics.

Descriptors: (*Nuclear power plants, *Spacecraft components), (*Meteors, Hazards), Reactor safety systems, Space flight, Astronautics.

AD-633 997 **Field 22B, 17B, 5C**
CFSTI Prices: HC$1.10 MF$0.50
RAND Corp., Santa Monica, Calif.
THE ECONOMIC IMPORTANCE OF SPACE TECHNOLOGY,
by William H. Meckling. Jun 62, 9p P-2585
Prepared for presentation at the National Conference on the Peaceful Uses of Space (2nd), Seattle, Washington, May 9, 1962.

Descriptors: (*Communication satellites (Active), *Economics), Meteorological satellites, Space communication systems, Space flight, Moon.

The exploration of space is a very exciting affair indeed. If glamour displaces science in guiding national policy, however, the results may be very disappointing. A communication satellite system that charges prices not very much different from present prices and that must be constantly subsidized and protected from competition, is not much of an accomplishment, and may be the subject of redicule rather than admiration.

N66-21700 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
FLIGHT REPORT. INTERPLANETARY MONITORING PLATFORM. IMP-I. EXPLORER XVIII,
by F. A. Carr. Apr 66, 31p NASA-TN-D-3352

Descriptors: *Flight characteristics, *Imp, *Spacecraft performance.

N66-21703 **Field 22B**
CFSTI Prices: HC$3.00 MF$0.75
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
I MP-I SPACECRAFT MAGNETIC TEST PROGRAM,
by C. A. Harris, and C. L. Parsons. Apr 66, 86p NASA-TN-D-3376

Descriptors: *Imp, *Test program, *Magnetic property.

N66-21704 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
THE SYNCOM III LAUNCH,
by F. H. Wainscott. Apr 66, 14p NASA-TN-D-3377

Descriptors: *Orbiting satellite, *Solid propellant, *Thrust augmentation, *Delta launch vehicle, *Synchronous communications (Syncom) Satellite.

N66-22201 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
THE LUNAR ORBITER PROJECT SELENODESY EXPERIMENT,
by W. H. Michael Jr., and R. H. Tolson. 1965, 27p NASA-TM-X-56513
Prepared for presentation at the International Symposium on the Use of Artificial Satellites for Geodesy (2nd), Athens, 27 Apr-1 May 1965.

Descriptors: *Gravitational potential, *Lunar orbiter, *Lunar gravitation.

N66-22206 **Field 22B**
CFSTI Prices: HC$1.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

THE DYNAMIC ENVIRONMENT OF SPACECRAFT SURFACE TRANSPORTATION,
by J. W. Schlue. 15 Mar 66, 25p JPL-TR-32-876
Contract NAS7-100
NASA CR-71771

Descriptors: *Spacecraft, *Transportation, *Vibration, *Shock sensitivity.

N66-22208 **Field 22B**
CFSTI Prices: HC$11.19 MF$4.00
Goodyear Aerospace Corp., Akron, Ohio.
RADAR REFLECTIVITY DATA ON A LENTICULAR PASSIVE COMMUNICATION SATELLITE.
Data rept., Apr-Jul 65
Sep 65, 819p GER-12331
Contract NAS1-3114
NASA CR-66050

Descriptors: *Passive satellite, *Reflector satellite system, *Radar reflector.

N66-22240 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
NASA LANGLEY SMALL METEOROLOGICAL SOUNDING ROCKET DEVELOPMENT PROGRAM,
by H. B. Tolefson. 1965, 38p NASA-TM-X-56686
Prepared for presentation at Indian National Comm. for Space Research Seminar on Sounding Rocket Tech. and Expt., Thumba, India, 11 Jan 1965.

Descriptors: *Meteorology, *NASA program, *Sounding rocket, *Upper atmosphere.

N66-22259 **Field 22B**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
DEVELOPMENT OF AN EXPANDABLE AIRLOCK UTILIZING THE ELASTIC RECOVERY PRINCIPLE,
by J. G. Williams. 1965, 32p NASA-TM-X-56354
Prepared for presentation at the Aerospace Expandable Struct. Conference, Minneapolis, 25-27 May 1965.

Descriptors: *Foamed material, *Potential energy, *Air lock, *Expandable structure.

N66-22321 **Field 22B**
CFSTI Prices: HC$3.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
ALPS GENERANT TANK AND CELL ASSEMBLY,
by O. F. Keller, and L. R. Toth. 28 Feb 66, 53p JPL-TR-32-865
Contract NAS7-100
NASA CR-71794

Descriptors: *Hydrazine, *Liquid propellant, *Propellant tank, *Bladder.

N66-22379 **Field 22B**
CFSTI Prices: HC$10.49 MF$3.50
Goodyear Aerospace Corp., Akron, Ohio.
FEASIBILITY STUDY AND PRELIMINARY DESIGN OF GRAVITY-GRADIENT-STABILIZED LENTICULAR TEST SATELLITE.
Interim technical rept., Jul 63-Mar 64.
1 Jun 64, 750p GER-11502
Contract NAS1-3114
NASA CR-66053

Descriptors: *Communications satellite, *Gravity gradient satellite, *Lenticular body.

AD-416 596 See Field 22C

AD-472 550 See Field 6S

AD-633 560 See Field 17B

AD-634 085 See Field 22A

PB-169 322 See Field 4B

22C. SPACECRAFT TRAJECTORIES AND REENTRY

AD-407 965 **Field 22C, 1A**
CFSTI Price: HC$1.60
Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE MEASUREMENT OF ELECTRON DENSITY IN THE WAKE OF A HYPERVELOCITY PELLET OVER A SIX-MAGNITUDE RANGE,
by M. Labitt. 15 Apr 63, 12p Technical rept. no. TR-307
Contract AF 19 (628)-500, ARPA order-13
N64 21145

Descriptors: (*Atmosphere entry, Electrons), (*Hypervelocity projectiles, Electrons), (*Electrons, Density), Wake, Measurement, Electron density, Gas ionization.

A UHF cavity probe was used to determine the line densities and collision frequencies of electrons deposited in the wakes of spherical aluminum pellets. Density data were obtained over a wide dynamic range of up to six orders of magnitude. These density curves are characterized by a sudden drop of about three or more orders of magnitude which occurs when the wake has cooled to a critical temperature that is a function of pressure. The sudden drop is attributed to the oxygen-molecule attachment-detachment equilibria, while the final leveling portion of the wake is regulated by the positive-to-negative-ion recombination rate. The collision frequencies throughout the entire density range are in agreement with those obtained through mobility studies. (Author)

AD-416 596 **Field 22C, 22B, 17G, 8E**
CFSTI Price: HC$1.00
Johns Hopkins Univ., Silver Spring, Md. Applied Physics Lab.
PRECISION TIME AND FREQUENCY APPLICATIONS IN THE TRANSIT AND ANNA SATELLITE PROGRAM,
by L. J. Rueger. 14 Dec 62, 18p TG-459

Descriptors: (*Navigation satellites, Satellite tracking systems), (*Satellite tracking systems, Navigation satellites), (*Geodesics, Satellite tracking systems), Doppler systems, Time, Frequency, Synchronization (Electronics), Satellites (Artificial).

Identifiers: ANNA, Transit.

The advent of earth satellites and the advances in frequency and time control in the past decade have opened new fields in global navigation. The Transit program is an application of these achievements. For a navigator to determine his position by the system, doppler data, orbit data, and accurate time are required. These elements are provided by carrying a precision UT-2 clock and a radio commanded memory in the polar orbiting satellite. As a consequence, world wide time synchronization is an important concept of the program. The ANNA program is a research activity for improving knowledge of the earth geodesy and for comparing several precision orbit determining techniques. The general features of each system will be briefly described and the time-frequency synchronization problems discussed. (Author)

AD-633 628 **Field 22C, 9B**
CFSTI Prices: HC$5.00 MF$1.25
Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
ORBIT DIFFERENTIAL CORRECTION - TRACKING PROGRAM. VOLUME III. SATELLITE ORBIT PREDICTION PROGRAM.
Final rept.,
by George E. Townsend. Apr 66, 199p SID-65-1203-3
Contract AF 30 (602)-3638,
Proj. AF-4519
RADC TR-66-67-Vol-3
See also AD-633 721.

Descriptors: (*Orbital trajectories, Corrections), (*Programming (Computers), *Satellite tracking systems), Perturbation theory, Programming languages, Computer logic.

This document presents the formulation, computational logic, and coding information developed for the purpose of tracking an artificial earth satellite in an open-loop mode. The program was developed as a FORTRAN IV, IBM 7094 program which uses the standard North American Aviation monitor system (NAASYS version 13). The logic presented is intended for use in developing a similar program for the Packard Bell 250 digital computer. The trajectory prediction portion of the program is a general perturbation formulation developed by Anthony G. Lubowe of Bell Telephone Laboratories. The tracking portion of the program can accept as many as ten tracking stations and outputs range, range-rate, azimuth and elevation data. (Author)

AD-633 684 **Field 22C, 17G**
CFSTI Prices: HC$1.00 MF$0.50
Foreign Technology Div., Wright-Patterson AFB, Ohio.
THE ELECTRONICS AND GUIDANCE OF INTERPLANETARY FLIGHT,
by Tan Wei-Yi. 17 Mar 66, 10p FTD-TT-65-1430
TT 66-61409
Edited trans. of Wu Hsien Tien (Chinese People's Republic) n11 p1-3 1963.

Descriptors: (*Interplanetary trajectories, *Space flight), (*Guidance, Space navigation), Electronic equipment, China.

The topics covered include rocket guidance systems, preset self-guided missile systems, command control guidance systems, beam-rider guidance systems, spacecraft free flight, guidance systems in interplanetary flight, launch guidance, midway guidance, and end guidance and landing control.

AD-633 720 **Field 22C, 9B**
CFSTI Prices: HC$8.75 MF$2.50
Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
ORBIT DIFFERENTIAL CORRECTION TRACKING PROGRAM. VOLUME I - DIFFERENTIAL CORRECTION GEOCENTRIC ORBIT COMPUTATIONS PROGRAM.
Final rept.,
by George E. Townsend. Apr 66, 577p SID-65-1203-1
Contract AF 30 (602)-3638,
Proj. RADC-4519
RADC TR-66-67-Vol-1

Descriptors: (*Orbital trajectories, Corrections), (*Programming (Computers), *Satellite tracking systems), Perturbation theory, Programming languages.

Identifiers: FORTRAN.

This document presents the formulation, computational logic and coding information developed for the purpose of effecting the definition of geocentric satellite orbits. The rationale for this process is constructed around the recursive minimum variance data filter developed by R.E. Kalman and a specially prepared magnetic tape generated in the preprocessor (AD-633 721). The trajectory portion of the program is formulated in the Encke manner and includes perturbing accelerations resulting from the first 3 harmonics of the Earth's potential function, atmospheric dray, solar radiation pressure, and solar and lunar gravitation. These accelerations are integrated via an uncor-

rected Gauss-Jackson routine started with a fourth order Runge-Kutta process. (Author)

AD-633 721 **Field 22C, 9B**
CFSTI Prices: HC$6.00 MF$1.25
Space and Information Systems Div., North American Aviation, Inc., Downey, Calif.
ORBIT DIFFERENTIAL CORRECTION - TRACKING PROGRAM. VOLUME II. PREPROCESSOR FOR THE DIFFERENTIAL CORRECTION PROGRAM.
Final rept.,
by George E. Townsend. Apr 66, 238p SID-65-1203-2
Contract AF 30(602)-3638,
Proj. AF-4519
RADC TR-66-67-Vol-2
See also AD-633 720.

Descriptors: (*Orbital trajectories, Corrections), (*Programming (Computers), *Satellite tracking systems), Programming languages, Computer logic.

The Preprocessor for the Differential Corrections Geocentric Orbit Computations Program (FS4-305A) is a data handling routine required in the reduction of satellite observations, and the computation of the associated trajectories. This program reads a specially generated magnetic tape containing coordinate data observations from a series of tracking stations. The data is smoothed, using least squares criteria, and then ordered. Primary ordering is time and secondary ordering is by station. Output includes a magnetic tape which is required as input for the Differential Corrections Geocentric Orbit Computations Program (FS4-305). (Author)

AD-634 120 **Field 22C, 17I**
CFSTI Prices: HC$1.10 MF$0.50
Ballistic Research Labs., Aberdeen Proving Ground, Md.
ORBIT DETERMINATION FROM DOPPLER SHIFT MEASUREMENTS IN AN ARBITRARY FORCE FIELD.
Technical note,
by C. Masaitis. Jun 1960, 10p TN-1318
Projs. DA-5B03-06-002, TB3-0007

Descriptors: (*Satellite tracking systems, *Doppler systems) Satellites (Artificial), Orbital trajectories, Doppler effect, Position finding, Radio equipment.

A method of determining a satellite orbit in an arbitrary force field from simultaneous three-station observations of the radio Doppler-shift is proposed. (Author)

N66-21647 **Field 22C**
CFSTI Prices: HC$4.00 MF$0.75
Massachusetts Inst. of Tech., Cambridge. Man-Vehicle Control Lab.
BENDING MODE ACCELERATION INFLUENCE ON PILOT CONTROL OF FLEXIBLE BOOSTER DYNAMICS.
Master's thesis,
by P. S. Kilpatrick. Sep 65, 113p T-65-2
Contract NsG-577
NASA CR-71389

Descriptors: *Bending, *Flexible body, *Saturn V launch vehicle, *Attitude control, *Pilot performance, *Simulation.

N66-22180 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
ANALYSIS OF A SIMPLE TECHNIQUE FOR ESTABLISHING LUNAR ORBITS,
by L. K. Barker, and G. W. Sparrow. 1965, 13p NASA-TM-X-56506
Prepared for presentation at the ATAA Annual Meeting (2nd) and Tech. Display, San Francisco, 26-29 Jul 1965.

Descriptors: *Orbital rendezvous, *Spacecraft guidance, *Thrust vector control, *Horizon, *Lunar orbit, *Parking orbit.

N66-22276 **Field 22C**
CFSTI Prices: HC$3.00 MF$0.50
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
A METHOD OF APPROXIMATING PROPELLANT REQUIREMENTS OF LOW-THRUST TRAJECTORIES,
by C. L. Zola. Apr 66, 53p NASA-TN-D-3400

Descriptors: *Propellant, *Trajectory optimization, *Approximation method, *Problem solving.

N66-22277 **Field 22C**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Moffett Field, Calif. Ames Research Center.
A METHOD OF TRAJECTORY OPTIMIZATION BY FAST-TIME REPETITIVE COMPUTATIONS,
by D. F. Crane, R. C. Wingrove, and J. S. Raby. Apr 66, 22p NASA-TN-D-3404

Descriptors: *Computer program, *State equation, *Trajectory optimization, *Perturbation theory, *Steepest descent method.

AD-442 394 **See Field 1A**

AD-450 558 **See Field 1A**

AD-633 667 **See Field 22A**

AD-633 863 **See Field 8E**

AD-633 864 **See Field 8E**

AD-633 999 **See Field 3B**

22D. SPACECRAFT LAUNCH VEHICLES AND GROUND SUPPORT

N66-21661 **Field 22D**
CFSTI Prices: HC$2.00 MF$0.50
Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
SPACE PROGRAM SUMMARY NO. 37-36, VOLUME VI FOR THE PERIOD SEPTEMBER 1, 1965 TO OCTOBER 31, 1965. SPACE EXPLORATION PROGRAMS AND SPACE SCIENCES.
30 Nov 65, 41p JPL-SPS-37-36, Vol. VI
Contract NAS7-100
NASA CR-71402

Descriptors: *Deep space instrumentation facility (DSIF), *Lunar program, *Planetary-interplanetary program.

N66-21783 **Field 22D**
CFSTI Prices: HC$2.00 MF$0.50
National Aeronautics and Space Administration, Cocoa Beach, Fla. John F. Kennedy Space Center.
THE EFFECTS OF SATURN VEHICLE LAUNCH NOISE ON PERSONNEL AND WINDOW GLASS,
by C. H. Sinex. 16 Nov 64, 32p TR-99-1, NASA-TM-X-57329

Descriptors: *Personnel, *Saturn I launch vehicle, *Window, *Noise hazard, *Wall.

N66-22223 **Field 22D**
CFSTI Prices: HC$7.00 MF$2.00
Boeing Co., Seattle, Wash. Aero-Space Div.
SOLID-BOOSTED NOVA VEHICLE STUDY, VOLUME III. CURRENT-TECHNOLOGY VEHICLE.
Final rept.
Apr 63, 380p Rept. no. D2-22431-Vol-3
Contract NAS8-2438
NASA CR-50591

Descriptors: *Launch vehicle configuration, *Nova launch vehicle, *Payload.

N66-22234 **Field 22D**
CFSTI Prices: HC$1.00 MF$0.50
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
SCOUT VEHICLE FLIGHT LOADS,
by H. C. Lester, and K. G. Pratt. 1965, 21p NASA-TM-X-56658
Prepared for presentation at the AIAA Structural Dynamics and Aeroelasticity Conference, Boston, 30 Aug-1 Sep 1965.

Descriptors: *Scout launch vehicle, *Stress analysis, *Aerodynamic load, *Gust load, *Wind effect.

N66-22362 **Field 22D**
CFSTI Prices: HC$2.00 MF$0.50
McDonnell Aircraft Corp., St. Louis, Mo.
SUMMARY OF THE DIGITAL ADAPTIVE FILTER, DIGITAL POLYNOMIAL FILTER AND SPECIFICATION SET CONTROL TECHNIQUES APPLIED TO LARGE LAUNCH VEHICLES,
by W. J. Luedde, and J. Zaborszky. Apr 66, 34p
Report no. B897
Contract NAS8-11418
NASA CR-462

Descriptors: *Guidance + control, *Launch vehicle, *Stability + control, *Adaptive control system, *Digital computer, *Feedback control system.

N66-22365 **Field 22D**
CFSTI Prices: HC$2.00 MF$0.50
Wyle Labs., Inc., Huntsville, Ala. Testing Div.
LOWEST AXISYMMETRIC BODY MODES OF VIBRATION OF THE APOLLO VEHICLE,
by N. Ahmed. 25 Mar 66, 31p WR-66-16
Contract NAS9-4305
NASA CR-65322

Descriptors: *Apollo spacecraft, *Vibration, *Orthotropic shell.

N66-22368 **Field 22D**
CFSTI Prices: HC$2.00 MF$0.50
Martin Co., Denver, Colo.
DESIGN OF AN ONBOARD CHECKOUT SYSTEM. VOLUME I. SUMMARY.
Final rept.
Mar 66, 30p CR-66-12-Vol-1
Contract NAS9-4899
NASA CR-65326

Descriptors: *Apollo project, *Checkout equipment.

* U.S. GOVERNMENT PRINTING OFFICE : 1966 OL—252-085—(2)

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CURRENT r & d PROJECTS

01 AERONAUTICS

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GQF 207501 FIELD 20D,20K

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

HYPERSONIC CONTROL SURFACE STUDIES

J. THOMAS

/65- /

DOD-AIR FORCE

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GQF 207502 FIELD 12A,13M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDY OF SONIC BOOM PROBLEM

J. PETTY

/65- /

DOD-AIR FORCE

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GQF 207519 FIELD 22C,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

DYNAMIC STABILITY TESTING TECHNIQUES

R. SHANAHAN

/65- /

DOD-AIR FORCE

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GQF 420556 1 FIELD 1C, 1B,20D,20K

HYPERSONIC LATERAL JET STUDIES

W. T. STRIKE

AF-40-600-1000
/65- /

DOD-AIR FORCE

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GQF 475214 FIELD 9C, 9+,20L,10B

F102 FLIGHT TEST OF THE WHTAKER 8-CHANNEL RECORDING SYSTEM

D. WHITFORD, R. J. DOMINIC

AF-33-615-1478
/65- /

DOD-AIR FORCE

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GQF 475215 2 FIELD 1B, 9C, 9+,20L

WHITTAKER 8-CHANNEL DATA ACQUISITION SYSTEM

D. HOBEL, P. BELCHER

AF-33-657-9574
/65- /

DOD-AIR FORCE

GQF 475259 FIELD 1C, 1B, 9C,15+

LEAR INC, MICHIGAN

RESEARCH AND DEVELOPMENT OF A CONTROL + DISPLAY SUBSYSTEM FOR A TACTICAL V+STOL WEAPON SYSTEM

J. T. SHEARER, J. G. FELLINGER

AF-33-615-2540
/65- /

DOD-AIR FORCE

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GQF 475391 1 FIELD 1B,17G,12A,22C

INVESTIGATION AND EXTENSION OF THE DESCRIBING + FUNCTION TECHNIQUE

D. GRAHAM, L. G. KAUFMANN

AF-33-615-1474
/65- /

DOD-AIR FORCE

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GQF 475411 1 FIELD 1C, 1B

A COMPILATION AND ANALYSIS OF FLIGHT CONTROL SYSTEM COMMAND INPUTS

D. H. WEIR

AF33-657-01818
/65- /

DOD-AIR FORCE

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GQF 475415 1 FIELD 1B,22C,12A

FLIGHT CONTROL DATA AND INFORMATION EXCHANGE PROGRAM

H. M. DYE, C. E. BLOOMQUIST, C. WILMOT

AF33-657-01818
/65- /

DOD-AIR FORCE

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GQN 530486 FIELD 1C, 1B,13J,20D

STEVENS INST OF TECH, GRADUATE SCHOOL, NEW JERSEY

HYDRODYNAMIC TOWING TANK INVESTIGATIONS

. NONE

N600-19-59107
/65- /

DOD-NAVY

03 ASTRONOMY AND ASTROPHYSICS

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GQF 6884 1 FIELD 3A

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, ASTRONOMY, NEW YORK

MAGNETIC FIELDS IN STARS AND GALAXIES

L. WOLTJER

AF-49-638-01358
/65- /

DOD-AIR FORCE

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GQF 207310 4 FIELD 3C, 3A, 5A,20J

UNIV OF PITTSBURGH, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

SOLUTIONS OF GRAVITATIONAL FIELD EQUATIONS

E. NEWMAN

AF-33-615-01523
/65- /

DOD-AIR FORCE

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GQF 207422 FIELD 5A,20J

UNIV OF LONDON, UNITED KINGDOM

NONE

H. BONDI

AF-EOAR-0021-65
/65- /

DOD-AIR FORCE

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GQF 207537 FIELD 22C, 3C,12A, 3A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

MATHEMATICAL METHODS IN ASTRO-DYNAMICS

L. WOLAVER

/65- /

DOD-AIR FORCE

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GQF 258233 3 FIELD 3A, 3B

STUDY OF RADIO FREQUENCY SPECTRUM OF SUN USING DYNAMIC SPECTRUM ANALYZER TECHNIQUES

A. MAXWELL

AF-19-628-02370
/65- /

DOD-AIR FORCE

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GQF 258234 1 FIELD 3A, 4A

SOLAR AND SOLAR-TERRESTRIAL PROBLEMS USING SAC PEAK AND OTHER DATA

D. H. MENZEL

AF-19-628-03322
/65- /

DOD-AIR FORCE

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GQF 258240 1 FIELD 3A, 3B, 7B

NATL OBSERV ATHENS, GREECE

INVESTIGATION OF DYNAMICS + FINE

STRUCTURE OF THE SOLAR CHROMOSPHERE

C. J. MACKIS

AF-61-052-00755
/65- /

DOD-AIR FORCE

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GQF 258602 1 FIELD 3A, 8D, 8G

UNIV OF MANCHESTER, UNITED KINGDOM

SPECTROSCOPIC STUDIES OF LUNAR SURFACE COMPOSITION

J. E. GEAKE

AF-61-052-00798
/65- /

DOD-AIR FORCE

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GQF 258607 4 FIELD 3A, 3B

OBSERVATORY DE PARIS, FRANCE

IR + VISIBLE POLARIMETRIC OBSERVATIONS OF MOON + NEAR PLANETS

A. DOLLFUS

AF-61-052-00508
/65- /

DOD-AIR FORCE

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GQF 258761 1 FIELD 3A, 3B,12A

DESIGN CONSTRUCT INSTALL TEST + OP ERATE INHOUSE SHOCK TUBE TO STUDY ASTROPHYSICALLY IMPORTANT GASES

K. S. KIM

AF-19-628-03883
/65- /

DOD-AIR FORCE

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GQF 259242 FIELD 3A, 3B

UNIV OF LONDON, UNITED KINGDOM

CONDUCT EXPERIMENTAL STUDIES TO DETERMINE THE TEMPERATURE + FRACTIONAL POLARIZATION OF THE MOON

J. A. BASTIN

AF-EOAR-0064-65
/65- /

DOD-AIR FORCE

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GQF 259340 FIELD 3A, 3B

UNIVERSITY OF DENVER, GRADUATE SCHOOL, COLORADO

INSTRUMENTATION AND SERVICES TO MEASURE PHYSICAL CHARACTERISTICS OF SIMULATED LUNAR-PLANETARY SOILS

. NONE

AF-19-628-04797
/65- /

DOD-AIR FORCE

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GQF 259351 FIELD 3A, 3B, 7D,20J

PERFORM LABORATORY ASTROPHYSICAL STUDIES USING OPTICAL SHOCK TUBE

C. H. CARNEVALE

AF-19-628-05053
/65- /

DOD-AIR FORCE

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GQF 259451 FIELD 3A, 3B, 9+,12A

CNRS BELLEVUE, NCE, FRANCE

MODIFICATION OF CONNES INTERFEROMETER FOR HIGHER RESOLUTION ON NARR BAND SPECTROSCOPIC STUDIES

P. CONNES

/65- /

DOD-AIR FORCE

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GQF 420551 FIELD 3A, 3B,12A,20F

SPECTRAL MEASUREMENT OF RADIATION IN SPACE

D. FRAZINE

AF-40-600-1000
/65- /

DOD-AIR FORCE

04 ATMOSPHERIC SCIENCES

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GQF 258018 FIELD 4A

UNIV OF PITTSBURGH, GRADUATE SCHOOL, PENNSYLVANIA

THEORETICAL STUDY OF CHEMICAL REACTIONS OF UPPER ATMOSPHERE SPECIES

F. KAUFMAN

AF-19-628-05056
/65- /

DOD-AIR FORCE

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GQF 258040 1 FIELD 9C, 8+, 9+

MINNEAPOLIS HONEYWEL, MINNESOTA

CONDUCT RADIO INTERFERENCE TESTS ON AIRCRAFT MOUNTED ALPHA-RADIATION DEW POINT HYGROMETER

J. E. CROWLEY

AF-19-628-03285
/65- /

DOD-AIR FORCE

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GQF 258052 2 FIELD 8+, 9+, 7B

TEST AND EVALUATION OF ALUMINUM OXIDE ELEMENTS FOR ATMOSPHERIC HUMIDITY PROBES

D. SCHLECK

AF-19-628-02449
/65- /

DOD-AIR FORCE

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GQF 258068 1

USDC, WEATH BUR, DIST OF COLUMBIA

WEATHER OBSERVING SERVICES IN SUPPORT OF PORCUPINE DOPPLER RADAR OPERATION IN NSSP FIELD PROGRAM

E. KESSLER

PRD-00561-64
/65- /

DOD-AIR FORCE

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GQF 258069 1

UNIV OF LONDON, UNITED KINGDOM

STUDY OF ENVIRONMENTAL CONDITIONS NEEDED FOR INITIATION OF LARGE CONVECTIVE STORMS

F. H. LUDLAM

AF-EOAR-0060-64
/65- /

DOD-AIR FORCE

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GQF 258100 1 FIELD 4A

U S TESTING CO INC, NEW JERSEY

STUDY OF ATMOSPHERIC DENSITY AND WINDS AND DETERMINATION OF AIR DENSITY FROM SATELLITE ORBITS

G. V. GROVES

AF-61-052-00781
/65- /

DOD-AIR FORCE

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GQF 258107 1 FIELD 3C, 4A, 3A, 8E

IBM CORP, CAMBRIDGE, MASSACHUSETTS

SATELLITE ORBIT ANALYSIS AND DETERMINATION OF ATMOSPHERIC DENSITY

. NONE

AF-19-628-04192
/65- /

DOD-AIR FORCE

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GQF 258113 1

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, METEOROLOGY, HAWAII

STUDY THE FORMATION GROWTH + DELAY OF TROPICAL CYCLONES + ANALYZE CLOUD PHOTO DATA

W. CHIU

AF-19-628-03860
/65- /

DOD-AIR FORCE

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GQF 258172 2 FIELD 4A

HIGH ALTITUDE ULTRAVIOLET BACKGROUND STUDIES

H. D. EDWARDS

AF-19-628-02416
/65- /

DOD-AIR FORCE

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GQF 258212 FIELD 4A, 8+, 9+,20F

CHALMERS UNIV OF TECH, SWEDEN

THEORETICAL STUDY OF THE LINEAR + NON-LINEAR EFFECTS ON PROPAGATION IN NON-HOMOGENEOUS MEDIA

O. E. RYDBECK

AF-61-052-00864
/65- /

DOD-AIR FORCE

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GQF 258306 1 FIELD 4A,12A

BLOCK ASSOC., INC.,, MASSACHUSETTS

STUDY OF HIGH RESOLUTION ABSORPTION BANDS AND ATMOSPHERIC SCATTERING

F. KNEIZYS

AF-19-628-03247
/65- /

DOD-AIR FORCE

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GQF 258308 1 FIELD 4A,20J, 5A,20F

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

STUDY THE RADIATIVE PROPERTIES + COMPOSITION OF AN ATMOSPHERE AS FUNCTIONS OF TIME + LOCATION

J. H. SHAW

AF-19-628-03806
/65- /

DOD-AIR FORCE

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GQF 258343 1

UNIV OF WISCONSIN, GRADUATE SCHOOL, METEOROLOGY, WISCONSIN

STUDY OF CLIMATIC FREQUENCIES OF STRONG WINDS ON HILLTOPS

R. J. DELAND

AF-19-628-03873
/65- /

DOD-AIR FORCE

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GQF 258480 FIELD 4A

UNIVERSITY OF OSLO, NORWAY

THEORETICAL + EXPERIMENTAL STUDY OF THE ELF EMISSIONS FROM MOLECULES AT HIGH ALTITUDES

A. EGELAND

AF-61-052-00811
/65- /

DOD-AIR FORCE

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GQF 258546

G. T. SCHJELDAHL CO., MINNESOTA

DESIGN AND FABRICATION OF RADAR REFLECTIVE BALLOON AS REPLACEMENT FOR ROSE METEOROLOGICAL BALLOON

. NONE

AF-19-628-05109
/65- /

DOD-AIR FORCE

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GQF 258566 4 FIELD 4A

RESEARCH DIRECTED TOWARD THE STUDY OF COSMIC RADIATION NEAR THE EARTHS NORTH GEOMA

M. POMERANTZ

AF-19-628-05200
/65- /

DOD-AIR FORCE

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GQF 258568 3 FIELD 4A, 5A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

PRODUCE INSTRUMENTATION AND STUDY FAST NEUTRON COSMIC RAY COMPONENT AT HIGH ALTITUDE AND IN NEAR SPACE

S. A. KORFF

AF-19-628-00378
/65- /

DOD-AIR FORCE

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GQF 258569 2 FIELD 4A, 5A

UNIV OF NEW HAMPSHIRE, GRADUATE SCHOOL, PHYSICS, NEW HAMPSHIRE

STUDY INTENSITY-TIME VARIATIONS OF COSMIC RADIATION USING PARTICLE DETECTION + EMULSION TECHNIQUES

J. A. LOCKWOOD

AF-19-628-02352
/65- /

DOD-AIR FORCE

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GQF 258647 2

UNIV OF WASHINGTON, GRADUATE SCHOOL, ATMOSPHERIC SCIENCE, WASHINGTON

PERFORM COMPARISONS OF 3-COMPONENT SONIC ANEMOMETERS AND COMPUTATION OF HEAT FLUX

J. A. BUSINGER

AF-19-628-02476
/65- /

DOD-AIR FORCE

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GQF 258659 3 FIELD 4A, 5A, 7B

UNIVERSITY NEW MEXICO, GRADUATE SCHOOL, PHYSICS, NEW MEXICO

PROVIDE OZONESONDES FOR IQSY OZONE SONDE NETWORK

V. H. REGENER

AF-19-628-00417
/65- /

DOD-AIR FORCE

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GQF 258692 FIELD 4A

COLLECTION OF IONOSPHERIC ABSORPTION DATA + MAINTAINANCE OF WORLDWIDE RIOMETER STATIONS

. NONE

AF-19-628-05175
/65- /

DOD-AIR FORCE

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GQF 258963 FIELD 4A, 9+, 9A

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

THEORETICAL AND EXPERIMENTAL STUDIES OF ATMOSPHERE AFFECTS ON PHASE FRONT OF 35GC WAVES

A. T. WATERMAN

AF-19-628-05054
/65- /

DOD-AIR FORCE

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GQF 258972 FIELD 8+, 9+, 9A

USDC, WEATH BUR, DIST OF COLUMBIA

CLIMATOLOGICAL STUDIES OF RADAR ECHOES INDICATING UNOBSTRUCTED AND CLOUDLESS LINES OF SIGHT

B. RATNER

/65- /

DOD-AIR FORCE

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GQF 258989 FIELD 9C, 9+, 9A

BARNES ENGR CO STAMFRD, CONNECTICUT

FABRICATE IR RADIOMETER FOR FREE AIR TEMPERATURE MEASUREMENTS FROM AIRCRAFT

. NONE

AF-19-628-05066
/65- /

DOD-AIR FORCE

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GQF 259068

DESIGN CONSTRUCT AND TEST OF EXPENDABLE MINIATURE DEW-POINT HYGROMETER

. NONE

AF-19-628-05079
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DOD-AIR FORCE

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GQF 259230 FIELD 4A

KJELLER RESEARCH ESTAB, NORWAY

THEORETICAL + EXPERIMENTAL STUDIES OF IONOSPHERIC PARAMETERS USING SATELLITE EMISSIONS AS SOURCES

J. FRIHAGEN

AF-61-052-00860
/65- /

DOD-AIR FORCE

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GQF 259296 FIELD 4A,20D

BROWN UNIVERSITY, GRADUATE SCHOOL, PHYSICS, RHODE ISLAND

STUDY OF FLUID DYNAMICAL MODELS SIMULATING LARGE SCALE ATMOSPHERIC CIRCULATIONS

H. A. SNYDER

AF-19-628-04783
/65- /

DOD-AIR FORCE

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GQF 259318 FIELD 7B

COLORADO STATE UNIV, SCHOOL OF ENGINEERING, ATMOSPHERIC SCIENCE, COLORADO

MEASUREMENT OF ATMOSPHERIC OZONE AND STUDY OF RELATIONSHIP OF OZONE DISTRIB TO CIRCULATION PROCESSES

L. D. GRANT

AF-19-628-04978
/65- /

DOD-AIR FORCE

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GQF 259342 FIELD 4A,12A

KIRUNA GEOPHYS OBSERV, SWEDEN

COLLECTION AND REDUCTION OF HIGH LATITUDE GEOMAGNETIC DATA

G. GUSTAFSON

AF-61-052-00866
/65- /

DOD-AIR FORCE

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GQF 259375 1 FIELD 4A,20F,20L

PHYSICAL AND CHEMICAL ANALYSIS OF NOCTILUCENT CLOUD PARTICLES BY ELECTRON MICROSCOPY TECHNIQUES

S. H. MOLL

AF-19-628-04035
/65- /

DOD-AIR FORCE

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GQF 259431 FIELD 4A

MCGILL UNIV, GRADUATE SCHOOL, METEOROLOGY, CANADA

STUDY OF DYNAMICS OF STRATOSPHERIC CIRCULATIONS

B. W. BOVILLE

AF-19-628-04955
/65- /

DOD-AIR FORCE

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GQF 259464 1

UNIV OF CAL-L. A., GRADUATE SCHOOL, METEOROLOGY, CALIFORNIA

ANALYSIS OF METEOROLOGICAL DATA COLLECTED BY U-2 AIRCRAFT AND FROM STANDARD SOURCES

J. G. EDINGER

AF-19-628-04146
/65- /

DOD-AIR FORCE

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GQF 259466 1

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, METEOROLOGY, ARIZONA

CONDUCT STUDIES IN THE AREA OF CLOUD PHYSICS INVOLVING GROUND-BASED BALLOON AND AIRCRAFT MEASUREMENTS

A. R. KASSANDER

AF-19-628-04180
/65- /

DOD-AIR FORCE

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GQF 259499 FIELD 22D, 9C, 9+, 9A

ENGINEERING SERVICES AND MODIFICATION OF ROCKET-BORNE SPECTROSCOPIC AND RADIOMETRIC INSTRUMENTATION

. NONE

AF-19-628-05047
/65- /

DOD-AIR FORCE

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GQF 259618 1 FIELD 4A,12A, 8E

AVCO MFG CORP WILMIN, MASSACHUSETTS

STUDY OF OPTIMUM METHODS OF UTILIZING ATMOS LIGHT SCATTERING DATA AND DIST OF OPTICAL PARAMETERS VS ALT

R. PENNDORF

AF-19-628-04072
/65- /

DOD-AIR FORCE

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GQF 259625 1 FIELD 3A, 4A, 5A, 7B

UNIVERSITY OF DENVER, GRADUATE SCHOOL, PHYSICS, COLORADO

CONDUCT BALLOON BORNE MEASUREMENTS OF SOLAR IRRADIANCE AT 100 THSD FEET

D. G. MURCRAY

AF-19-628-04177
/65- /

DOD-AIR FORCE

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GQF 259667 FIELD 4A

UNIV OF MELBOURNE, AUSTRALIA

RESEARCH DIRECTED TOWARD STUDY OF IONOSPHERIC IRREGULARITIES IN THE SOUTHERN HEMISPHERE

J. A. THOMAS

AF-AFOSR-0679-64
/65- /

DOD-AIR FORCE

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GQF 259673 FIELD 4A,20F

FIELD OPERATIONS + DATA ANALYSIS OF CHEMILUMINESCENT UPPER AIR TRAILS

H. D. EDWARDS

AF-19-628-04781
/65- /

DOD-AIR FORCE

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GQF 259691 FIELD 4A, 8+, 9+, 9A

H R B SINGERS INC ST, PENNSYLVANIA

RESEARCH DIRECTED TOWARD INVESTIGATION OF THE PROPERTIES OF THE IONOSPHERIC D LAYER

C. SECHRIST

AF-19-628-04977
/65- /

DOD-AIR FORCE

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GQF 259769 2 FIELD 8+, 9+

STUDY OF SFERICS INTENSITY + LOCATION IN SO. NEW ENGLAND USING A TWO STATION TECHNIQUE

K. F. KINNARD

AF-19-628-02825
/65- /

DOD-AIR FORCE

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GQF 259819 FIELD 10B,19+

MITHRAS INC CAMBRIDGE, MASSACHUSETTS

RESEARCH STUDY DIRECTED TOWARD THE ANALYSIS OF ROCKET PLUME + HIGH ALTITUDE CHEMICAL GAS DYNAMICS

J. A. HILL

AF-19-628-04218
/65- /

DOD-AIR FORCE

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GQF 259825 FIELD 4A

TECHNICAL OPERATIONS, MASSACHUSETTS

ANALYSIS OF UPPER AIR LUMINOUS CLOUD PHOTOGRAMETRIC DATA TO DETERMINE PHOTON EMISSION VS TIME

NONE

AF-19-628-04300
/65- /

DOD-AIR FORCE

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GQF 259830 FIELD 4A,20I

NORTHEASTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

THEORETICAL RESEARCH ON IONOSPHERIC PERTURBATIONS RESULTING FROM NATURAL OR MAN-MADE WAVE MOTIONS

H. R. RAEMER

AF-19-628-04325
/65- /

DOD-AIR FORCE

05 BEHAVIORAL AND SOCIAL SCIENCES

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GQF 258514 2 FIELD 12A, 9D

IBM RESEARCH CENTER, NEW YORK

EFFORT ON DETAILED MACHINEABLE DESCRIPTION OF ENGLISH + APPLICATION TO NATURAL LANGUAGE DOCUMENT RETRIEVAL

M. KOCHEN

AF-19-628-05127
/65- /

DOD-AIR FORCE

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GQF 259558 FIELD 8F

US, NSF, DIST OF COLUMBIA

FUNDS TRANSFER TO NSF FOR SUPPORT OF METEOROLOGICAL AND GEOPHYSICAL ABSTRACTS

. NONE

PRO-00528-65
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DOD-AIR FORCE

06 BIOLOGICAL AND MEDICAL SCIENCES

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GQF 388607 FIELD 5E, 7D, 7B

BENDIX CORP DAVENPOR, IOWA

ACTIVATED CARBON CARBON DIOXIDE REMOVAL SYSTEM

B. SOLLAMI, P. WILDERMUTH

AF-33-615-2443
/65- /

DOD-AIR FORCE

07 CHEMISTRY

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GQF 6823 FIELD 7D,21B, 7A,11F

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, CHEMICAL ENGINEERING, CALIFORNIA

REACTIONS BETWEEN METALS AND HYDROCARBONS

M. BOUDART

AF-49-638-01423
/65- /

DOD-AIR FORCE

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GQF 6831 FIELD 7C, 7A, 7D,20J

UNIV OF ROCHESTER, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

UNIMOLECULAR DECOMPOSITION OF CYCLOBUTANE DERIVATIVES AT HIGH PRESSURE

D. J. WILSON, W. D. WALTERS

AF-AFOSR-0575-64
/65- /

DOD-AIR FORCE

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GQF 6846 1 FIELD 7C, 7D,20J, 7B

MELLON INST OF INDUS, PENNSYLVANIA

TRANSITION METAL COMPLEXES CONTAINING NITROGEN PHOSPHORUS OR SULFUR

R. B. KING

AF-AFOSR-0580-64
/65- /

DOD-AIR FORCE

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GQF 6847 1 FIELD 7C, 7D, 7A,20M

UNIV OF WASHINGTON, GRADUATE SCHOOL, CHEMISTRY, WASHINGTON

ACTIVITY DEPENDANCE OF REACTION RATES AND EQUILIBRIA IN STRONG AQUEOUS ACIDS

W. M. SCHUBERT

AF-AFOSR-0590-64
/65- /

DOD-AIR FORCE

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GQF 6851 1 FIELD 7C, 7D, 7B

JOHNSTON WH LABS, MARYLAND

COINCIDENCE MEASUREMENTS OF MOLECULE-ION REACTIONS

W. H. JOHNSON, H. L. VESTAL

AF-49-638-01365
/65- /

DOD-AIR FORCE

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GQF 6862 1 FIELD 7C, 7A, 7D,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

THE CHEMISTRY OF CARBANIONS

H. O. HOUSE

AF-AFOSR-0573-64
/65- /

DOD-AIR FORCE

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GQF 6863 1 FIELD 7C, 7A, 7D

BRANDEIS UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

PHOTOCHEMISTRY OF AZO COMPOUNDS AND STUDIES IN UNIMOLECULAR REACTIONS

C. STEEL

AF-AFOSR-0583-64
/65- /

DOD-AIR FORCE

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GQF 6911 1 FIELD 7C, 7D, 7A,20J

VANDERBILT UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, TENNESSEE

COORDINATION LIGAND REACTIVITY AND CATALYSIS

M. M. JONES

AF-AFOSR-0630-64
/65- /

DOD-AIR FORCE

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GQF 14270 FIELD 7D, 5A

UNIV OF RHODE ISLAND, GRADUATE SCHOOL, CHEMISTRY, RHODE ISLAND

GORDON RESEARCH CONFERENCE ON INORGANIC CHEMISTRY

W. G. PARKS

AF-AFOSR-0940-65
/65- /

DOD-AIR FORCE

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GQF 20132 FIELD 7C, 7A, 5A,20D

KENT STATE UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, OHIO

CONFERENCE ON LIQUID CRYSTALS

G. H. BROWN

AF-AFOSR-0971-65
/65- /

DOD-AIR FORCE

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GQF 207169 1 FIELD 7D, 7B

TULANE UNIV OF LA, GRADUATE SCHOOL, CHEMISTRY, LOUISIANA

PHYSICAL AND PREPARATIVE STUDIES OF TRANSITION METAL CHELATES

R. D. ARCHER

AF-33-615-01043
/65- /

DOD-AIR FORCE

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GQF 207171 1 FIELD 7C, 7D, 7B

MONSANTO RES. CORP.,, OHIO

SOLVENT EXTRACTION STUDY OF METAL FLUORACETYLACETONATES

W. G. SCRIBNER

AF-33-615-01093
/65- /

DOD-AIR FORCE

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GQF 207172 8 FIELD 7C,19D, 7A, 7D

UNIV OF GUTTINGEN, GERMANY

INVESTIGATION OF CHEMICAL REACTIONS IN SHOCKS AND DETONATIONS

W. JOST

AF-EOAR-0075-65
/65- /

DOD-AIR FORCE

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GQF 207175 4 FIELD 7C, 7A, 7D, 7B

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

ONE-PHASE RADIATION CHEMISTRY

F. W. LAMPE

AF-38-615-01307
/65- /

DOD-AIR FORCE

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GQF 207184 3 FIELD 7C, 7D,20M

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, CHEMISTRY, MARYLAND

CHEMICAL RESEARCH ON POLYPHENALS

G. F. WOODS

AF-33-615-02710
/65- /

DOD-AIR FORCE

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GQF 207230 1 FIELD 20M,20L, 7B

MARQUETTE UNIVERSITY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, WISCONSIN

DEFECT CONTROLLED ELECTRICAL PROPERTIES OF RUTILE

W. M. HIRTHE

AF-33-615-01244
/65- /

DOD-AIR FORCE

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GQF 207415 FIELD 7C, 7D, 7B

MONSANTO RES. CORP.,, OHIO

SEPARATION OF METAL CATIONS BY PHOSPHORUS-NITROGEN REAGENTS

D. R. NIELSON

AF-33-615-02218
/65- /

DOD-AIR FORCE

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GQF 207485 FIELD 7C,21I, 7D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON TERTIARY AMINES AND DERVATIVES

L. SPIALTER

/65- /

DOD-AIR FORCE

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GQF 207486 FIELD 7C, 7A, 7D,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON PERARYLATED SILANES

L. SPIALTER

/65- /

DOD-AIR FORCE

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GQF 207487 FIELD 7C, 7D, 7A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH IN HIGH ENERGY CHEMICAL KINETICS

J. FUTRELL

/65- /

DOD-AIR FORCE

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GQF 258210 2 FIELD 7D,14E,20J, 7B

NORTHEASTERN UNIV, GRADUATE SCHOOL, CHEMISTRY, MASSACHUSETTS

CONTINUATION OF RSCH TO MEASURE ABSORPTION PROCESSES OF ATM GASES AND VACUUM UV EXPMTL TECHNIQUES

J. L. ROEBBER

AF-19-628-02361
/65- /

DOD-AIR FORCE

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GQF 258639 4 FIELD 7D, 7B

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, CHEMISTRY, PENNSYLVANIA

STUDIES OF THE INFRARED ABSORPTION BANDS OF THE OXIDES OF NITROGEN

I. C. HISATSUNE

AF-19-604-07987
/65- /

DOD-AIR FORCE

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GQF 258681 FIELD 20J,20F, 7B

UNIV OF OXFORD, UNITED KINGDOM

STUDY OF POLYATOMIC MOLECULAR VIBRATION-ROTATION BAND INTENSITIES BY IR DISPERSION TECHNIQUES

H. W. THOMPSON

AF-61-052-00790
/65- /

DOD-AIR FORCE

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GQF 258736 1 FIELD 7D, 4A,20J, 7B

US, SMITHSONIAN INST, DIST OF COLUMBIA

STUDY OF THE COLLISION PROPERTIES OF ATOMS AND MOLECULES

N. P. CARLETON

AF-19-628-04203
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GQF 258797 1 FIELD 7D,20J,20F,20L

UNIV OF GRONINGEN, NETHERLANDS

RESEARCH ON THE MECHANISM OF CONDUCTION IN ORGANIC DONOR-ACCEPTOR COMPLEXES

J. KOMMANDEUR

AF-61-052-00769
/65- /

DOD-AIR FORCE

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GQF 259078 2 FIELD 7C, 7D, 7A,20M

TUFTS UNIVERSITY, GRADUATE SCHOOL, MASSACHUSETTS

EXPERIMENTAL STUDY TO DETERMINE IN A PLASMA JET THE EFFECTS OF CHEMICAL ADDITIVES ON ELECTRON DENSITY

S. ATALLAH

AF-19-628-02377
/65- /

DOD-AIR FORCE

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GQF 259376 1 FIELD 7C,12A, 7D,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, CHEMISTRY, NEW YORK

RESEARCH ON ELECTRONIC STRUCTURE OF ORGANIC MOLECULES AND ORGANIC SEMICONDUCTORS

J. W. MOSKOWITZ

AF-19-628-04040
/65- /

DOD-AIR FORCE

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GQF 259646 FIELD 7C,21B,20J, 5A

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, OHIO

STUDY OF INFRARED EMISSION + ABSORPTION BANDS OF MOLECULES BY PHASE DISCIMINATION TECHNIQUES

F. P. DICKEY

AF-19-628-04331
/65- /

DOD-AIR FORCE

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GQF 259836 FIELD 4A,20J, 7B

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, CALIFORNIA

RESEARCH ON UPPER AIR CHEMICAL REACTIONS OF NITROGEN + OXYGEN + THE RECOMBINATION + EMISSION FACTORS

J. KAPLAN

AF-19-628-04388
/65- /

DOD-AIR FORCE

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GQF 284657 2 FIELD 7C, 7A, 7D,20M

IOWA ST UNIV SCI TECH, GRADUATE SCHOOL, CHEMISTRY, IOWA

SYNTHESIS OF ORGANOMETALLIC COMPOUNDS OF SILICON

H. GILMAN

AF-33-657-10288
/65- /

DOD-AIR FORCE

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GQF 284660 3 FIELD 7C, 7D,20M,20J

UNIV OF LONDON, UNITED KINGDOM

TRANSITION-METAL CARBON CHEMISTRY

G. WILKINSON

AF-EOAR-0075-64
/65- /

DOD-AIR FORCE

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GQF 284661 1 FIELD 7C, 7B

ISR INST OF TECHNOLOGY, ISRAEL

THE SYNTHESIS OF POLYMETAL PI-BONDED ORGANOMETALLIC COMPOUNDS

M. CAIS

AF-61-052-00752
/65- /

DOD-AIR FORCE

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GQF 284663 1 FIELD 7C, 7D, 7B

DOW CHEM CO, MICHIGAN

SYNTHESIS AND CHARACTERIZATION OF SULFER-NITROGEN INORGANIC POLYMERS

R. P. RUH

AF-33-615-01226
/65- /

DOD-AIR FORCE

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GQF 284664 1 FIELD 7C, 7D

UNIV OF NOTRE DAME, GRADUATE SCHOOL, CHEMISTRY, INDIANA

SYNTHESIS AND CHARACTERIZATION OF ARYLSULFIMIDE POLYMERS

G. F. DALELIO

AF-33-615-01163
/65- /

DOD-AIR FORCE

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GQF 284672 3 FIELD 7C, 7D,20H,20L

PHYSICAL PROPERTIES OF NOVEL POLYMERS

M. MORTON

AF-33-657-10868
/65- /

DOD-AIR FORCE

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GQF 284727 2 FIELD 7C,20J,20F

MELLON INST OF INDUS, PENNSYLVANIA

TORSIONAL VIBRATIONS OF SUBSTITUTED AROMATIC MOLECULES

W. G. FATELEY

AF-33-657-11142
/65- /

DOD-AIR FORCE

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GQF 284826 6 FIELD 12A, 7D,20H,20J

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, MARYLAND

DISCRETE ENERGY LEVELS IN SYSTEMS OF ATOMS

J. B. NEUMANN

AF-33-615-02324
/65- /

DOD-AIR FORCE

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GQF 284846 1 FIELD 7C, 7D

CHARACTERISTIC FREQUENCIES OF ALPHATIC DICARBOXYLIC ACIDS

J. J. SHOPMANN

AF-33-657-11206
/65- /

DOD-AIR FORCE

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GQF 284849 1 FIELD 7C, 7D,20M,20J

MELPAR INC, VIRGINIA

RADIATION CHEMISTRY OF METAL CYCLOPENTADIENE

R. C. MCILHENNY

AF-33-615-01694
/65- /

DOD-AIR FORCE

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GQF 284923 FIELD 7C, 7D,12A

BATTELLE MEMORIAL IN, OHIO

HIGH RESOLUTION PROTON MAGNETIC RESONANCE OF MONOSUBSTITUTED BENZENES

T. PAGE

AF-33-615-02441
/65- /

DOD-AIR FORCE

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GQF 284932 FIELD 7C, 7D, 7A,20J

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

ENERGY TRANSFER PROCESSES

M. A. GOLUB

AF-33-615-02354
/65- /

DOD-AIR FORCE

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GQF 284950 5 FIELD 7C, 7D,20J, 7B

UNIV OF VIENNA, AUSTRIA

ORGANIC CHEMISTRY OF FERROCENE

K. SCHLOGL

AF-61-052-00383
/65- /

DOD-AIR FORCE

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GQQ 595145 2 FIELD 7D

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, CHEMISTRY, NORTH CAROLINA

THIN LAYER CHROMATOGRAPHY WITH LIQUID ION EXCHANGER SUBSTRATES

R. W. MURRAY

SD-100
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

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GQQ 595152 2 FIELD 7C, 7D,20J

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, CHEMISTRY, NORTH CAROLINA

SPECTROSCOPY AND PHOTOCHEMISTRY OF ORGANIC MOLECULES

H. H. DEARMAN, N. S. CHARI

SD-100
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

08 EARTH SCIENCES AND OCEANOGRAPHY

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GQF 6876 1 FIELD 8K, 8G

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, NEW YORK

MEASUREMENT OF P + S SOUND VELOCITIES UNDER PRESSURE ON LAB MODELS OF THE EARTHS MANTLE

D. L. ANDERSON

AF-49-638-01355
/65- /

DOD-AIR FORCE

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GQF 6924 1 FIELD 8K, 5A

NEW MEX INST MIN + TEC, GRADUATE SCHOOL, PHYSICS + GEOPHYSICS, NEW MEXICO

RESEARCH ON SHORT PERIOD MICROSEISMS

A. R. SANFORD

AF-AFOSR-0658-64
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DOD-AIR FORCE

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GQF 258124 2 FIELD 8N, 8G

UNIVERSITY OF HAWAII, GRADUATE SCHOOL, GEOPHYSICS, HAWAII

PERFORM OBSERVATIONS FOR PROGRAM TO DEVELOP A WORLD GRAVITY CALIBRATION STANDARD

G. P. WOOLLARD

AF-19-628-02849
/65- /

DOD-AIR FORCE

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GQF 258136 1 FIELD 13B, 8G, 8+, 9+

EDGERTON GERMESHAUSE, N + GRIER, BOSTON, MASSACHUSETTS

FABRICATE LIGHTWEIGHT OPTICAL BEACON UNITS SUITABLE FOR USE AS BALLOON-BORNE GEODETIC TARGETS

F. GRONBERG

AF-19-628-05139
/65- /

DOD-AIR FORCE

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GQF 258196 1 FIELD 13B, 8F, 8G

BOSTON COLLEGE, GRADUATE SCHOOL, GEOLOGY, MASSACHUSETTS

INTERPRET GEOLOGICAL PHENOMENA IN SATELLITE PHOTOGRAPHY

J. W. SKEHAN

AF-19-628-03990
/65- /

DOD-AIR FORCE

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GQF 258226 2 FIELD 8K, 8+,12A, 9C

INVESTIGATE PROPERTIES AND STATISTICS OF EVENTS RECORDED OVER SMALL SEISMIC ARRAY IN NEW ENGLAND

A. HOLT

AF-19-628-02776
/65- /

DOD-AIR FORCE

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GQF 258232 1 FIELD 8G, 8E,12A

MASS INST OF TECHNOL, GRADUATE SCHOOL, GEOLOGY + GEOPHYSICS, MASSACHUSETTS

STUDY OF HEAT FLOW IN THE EARTHS CRUST + CONDUCTIVITY COEFFICIENT IN ROCK MATERIALS

W. F. BRACE

AF-19-628-03298
/65- /

DOD-AIR FORCE

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GQF 258611 2 FIELD 3A, 8D, 8G

BROWN UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, RHODE ISLAND

RESEARCH ON THE FREQUENCY + COMPOSITION OF METEORITIC SPHERULES IN ANCIENT SALT DEPOSITS

T. A. HUTCH

AF-19-628-02841
/65- /

DOD-AIR FORCE

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GQF 258720 2 FIELD 13B, 8F, 8H, 8G

UNIV OF MASSACHUSETTS, GRADUATE SCHOOL, GEOLOGY, MASSACHUSETTS

RSCH ON FORMATION DISTRIBUTION + PHYSICAL CHARAC OF DESERT TERRAIN ELEMENTS IN AFRICA + ARABIAN PENIN

W. S. MOTT

AF-19-628-02486
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DOD-AIR FORCE

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GQF 258721 4 FIELD 13B, 7D, 8D, 8F

COLUMBIA UNIVERSITY, GRADUATE SCHOOL, GEOLOGY, NEW YORK

STUDY ROLE OF CLAY MINERALS IN LANDSLIDE MOVEMENTS + MEASURE IN REFLECTION PROPERTIES OF CLAY

P. F. KERR

AF-19-604-08387
/65- /

DOD-AIR FORCE

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GQF 258727 1 FIELD 13B, 8N, 8F, 8K

STANFORD UNIVERSITY, GRADUATE SCHOOL, GEOPHYSICS, CALIFORNIA

STUDY OF THE CRUSTAL MOVEMENTS IN THE BASIN-RANGE AREA OF CALIFORNIA + NEVADA

G. A. THOMPSON

AF-19-628-03867
/65- /

DOD-AIR FORCE

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GQF 258945 FIELD 8+, 9+, 9A

UNIVERSITY OF NAPLES, ITALY

THEORETICAL + EXPERIMENTAL STUDIES OF TERRESTRIAL SURFACE EM WAVES ALONG VARIOUS TERRAINS

G. LAMIRAL

AF-61-052-00851
/65- /

DOD-AIR FORCE

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GQF 259293 2 FIELD 9+

VARIAN ASSOCIATES, PALO ALTO, CALIFORNIA

DEVELOPMENT AND CONSTRUCTION OF TWO RUBIDIUM VAPOR MAGENTOMETERS FOR USE IN ROCKETS

R. MORRIS

AF-19-628-00486
/65- /

DOD-AIR FORCE

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GQF 259481 FIELD 8K

RESEARCH ON DETERMINATION OF DEPTH OF FOCUS AND MAGNITUDE USING SELECTED EARTHQUAKE PHASE ARRIVALS

D. H. SHURBET

AF-EOAR-0705-64
/65- /

DOD-AIR FORCE

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GQF 259487 FIELD 1B, 8G

AEROFLEX LABS INC, LONG ISLAND, NEW YORK

PROVIDE TECH REP SERVICE FOR STABILIZED PLATFORMS IN AFCRL AIRBORNE GRAVITY PROGRAM

. NONE

AF-19-628-04778
/65- /

DOD-AIR FORCE

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GQF 259512 1 FIELD 8+, 9+

AVCO MFG CORP WILMIN, MASSACHUSETTS

NONE

A. D. PIERCE

AF-19-628-03891
/65- /

DOD-AIR FORCE

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GQF 259522 1 FIELD 13B, 8F

STUDY TO DETERMINE BY PHOTOGRAPHIC TECHNIQUES THE TERRAIN CHARACTERISTICS OF SE AREAS

J. LEACHTENAUER

AF-19-628-04166
/65- /

DOD-AIR FORCE

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GQF 259532 1 FIELD 8K

UNIV OF UPPSALA, SWEDEN

RESEARCH IN SEISMOLOGY WAVES + THEORETICAL SEISMOLOGY

N. BATH

AF-61-052-00702
/65- /

DOD-AIR FORCE

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GQF 259544 1 FIELD 8G

USDI, GEOL SURV, DIST OF COLUMBIA

USAF CONTRIBUTION TO BASIC RSCH PROGRAM IN GEOTHERMAL STUDIES SPONSERED BY AFCRL USGS + ONR

A. LACHENBRUCH

PRO-00506-65
/65- /

DOD-AIR FORCE

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GQF 260425 FIELD 9C, 9+, 9A

TEX. INSTR., INC., D, TEXAS

MODIFICATION OF WORDEN DIGITAL AIRBORNE GRAVITY METER

. NONE

AF-19-628-05190
/65- /

DOD-AIR FORCE

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GQF 260427 FIELD 8F

USDI, GEOL SURV, DIST OF COLUMBIA

GEOMORPHIC INVESTIGATIONS OF LAND FORMS IN ARID REGIONS OF MEXICO REGIONS OF MEXICO + PERU

V. C. FRYKLUND

PRO-00537-65
/65- /

DOD-AIR FORCE

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GQF 550193 3 FIELD 13B

EXPERIMENTAL STUDY OF SOIL SHEAR

H. C. SAXE

AF-29-601-05174
/65- /

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GQF 550197 2 FIELD 8K,12A, 8E,20H

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

DEVELOPMENT FOR A MODEL TO SIMULATE FREE+FIELD GROUND MOTIONS

N. NEWMARK, A. ANG

AF-29-601-05851
/65- /

DOD-AIR FORCE

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GQF 550198 2 FIELD 13B

STUDIES IN WAVE PROPAGATION

G. TRIANDAFILIDIS, G. +. TRIANDAFILIDIS

AF-29-601-06002
/65- /

DOD-AIR FORCE

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GQF 550199 1 FIELD 13B

INDIVIDUAL GRANTS, NEW YORK

A STUDY OF THE SHOCK EFFECTS ON GRANULAR LOCKING BODIES

M. BARON, H. BLEICH

AF-29-601-6055
/65- /

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GQF 550200 1 FIELD 8D, 8G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

DEVELOPMENT OF INDICES RELATING THE PHYSICAL PROPERTIES AND THE ENGINEERING BEHAVIOR OF ROCK

D. U. DEERE

AF-29-601-6319
/65- /

DOD-AIR FORCE

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GQF 550201 1 FIELD 13B

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

STUDY OF SANDS SUBJECTED TO DYNAMIC AND RAPID LOADING TO HIGH STRESS LEVELS

M. T. DAVISSON

AF-29-601-06369
/65- /

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GQF 550203 1 FIELD 13B, 8G

IIT RESEARCH INSTITUTE, AT ILL INST OF TECHNOL, ILLINOIS

BEHAVIOR OF SOIL AND ROCK UNDER HIGH PRESSURE

R. H. CORNISH

AF-29-601-6411
/65- /

DOD-AIR FORCE

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GQF 550214 FIELD 13B

IIT RESEARCH INSTITUTE, AT ILL INST OF TECHNOL, ILLINOIS

STRESS WAVE PROPAGATION IN CONFINED SOILS

E. SELIG, D. HAMPTON

AF-29-601-6717
/65- /

DOD-AIR FORCE

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GQF 550242 2 FIELD 13B

DEVELOPMENT OF X-RAY TECHNIQUES FOR DETECTING SOIL MOTION

F. JANZA

AF-29-601-06002
/65- /

DOD-AIR FORCE

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GQF 550247 2 FIELD 13B

DEVELOPMENT OF AN ON+STRUCTURE SELF+RECORDING NORMAL LOAD GAGE

R. OBENCHAIN, J. R. STAGNER

AF-29-601-06103
/65- /

DOD-AIR FORCE

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GQF 550248 1 FIELD 13B,15+, 9+, 9A

IIT RESEARCH INSTITUTE, AT ILL INST OF TECHNOL, ILLINOIS

CONTINUED DEVELOPMENT OF SOIL STRAIN GAGES FOR DYNAMIC SOILS TESTING

E. VEY, W. TRUESDALE

AF-29-601-6410
/65- /

DOD-AIR FORCE

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GQN 544113 FIELD 8G, 8H

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

DEEP-SEA SEDIMENTS STUDIES

A. F. RICHARDS

NONR3985-09
/65- /

DOD-NAVY

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GQP 140921 FIELD 8K, 8H,20D

NATL ENGR SCIENCE CO, PASADENA, CALIFORNIA

HYDRODYNAMIC TANK STUDIES OF WATER EAVES

B. LEMEHOUTE

DA-49-146-XZ-272
/65- /

DEFENSE-ATOMIC SUPPORT AGENCY

09 ELECTRONICS AND ELECTRICAL ENGINEERING

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GQF 6778 1 FIELD 9+,12A, 9D

STEVENS INST OF TECH, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW JERSEY

SIGNAL ANALYSIS METHODS FOR ADAPTIVE CONTROL SYSTEMS

P. R. CLEMENT

AF-AFOSR-0601-64
/65- /

DOD-AIR FORCE

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GQF 6879 1 FIELD 9+,12A

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

RESEARCH IN SYSTEM THEORY

M. E. VANVALKENBURG

AF-AFOSR-0931-65
/65- /

DOD-AIR FORCE

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GQF 6931 1 FIELD 9+,12A, 9D, 9C

PURDUE UNIVERSITY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, INDIANA

MACHINE PROCESSING TECHNIQUES FOR REFERENCE TEXT PREPARATION

Y. S. TOULOUKIAN

AF-49-638-01371
/65- /

DOD-AIR FORCE

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GQF 6934 1 FIELD 9+,12A, 9D, 5C

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

SWITCHING AND AUTOMATA THEORY

A. GILL

AF-AFOSR-0639-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 20033 FIELD 9+

WESTINGHOUSE ELECTRIC, MARYLAND

SYMPOSIUM ON SIMULATION AND SIMULATORS OF DYNAMIC SYSTEMS

G. SHAPIRO

AF-49-638-01592
/65- /

DOD-AIR FORCE

••••••••••

GQF 207538 FIELD 9+,12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

NONLINEAR SYSTEMS DRIVEN BY RANDOM NOISE

L. WOLAVER

/65- /

DOD-AIR FORCE

••••••••••

GQF 258457 1 FIELD 9D

PARKE MATH. LAB., CA, MASSACHUSETTS

MATHEMATICAL STUDIES ON CODING THEORY WITH EMPHASIS ON ERROR CORRECTING + VARIABLE LENGTH CODES

L. CALABI

AF-19-628-03826
/65- /

DOD-AIR FORCE

••••••••••

GQF 258458 4 FIELD 12A, 9D

SYLVANIA ELEC. PROD., MASSACHUSETTS

THEORETICAL STUDY OF GROUP CODES WITH ERROR-CORRECTING CAPABILITIES FOR VARIOUS REDUNDANCY RATIOS

H. F. MATTSON

AF-19-604-08516
/65- /

DOD-AIR FORCE

••••••••••

GQF 258471 3 FIELD 9+

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

ANALYSIS + SYNTHESIS OF DISTRIBUTED NETWORKS + MULTILOOP ACTIVE NET WORKS WITH FEEDBACK

M. S. GHAUSI

AF-19-628-00379
/65- /

DOD-AIR FORCE

••••••••••

GQF 258552 2 FIELD 9+, 9A, 5A,20F

THEORETICAL + EXP STUDIES OF NEW + IMPROVED ANTENNAS + THEIR CHARACTERISTICS IN AIR + OTHER MEDIA

R. W. KING

AF-19-628-02406
/65- /

DOD-AIR FORCE

••••••••••

GQF 258554 1 FIELD 9+

TECH UNIV OF DENMARK, DENMARK

THEORETICAL + EXPERIMENTAL STUDY OF VAN ATTA TYPE REFLECTORS AS PASSIVE + ACTIVE DEVICES

H. L. KNUDSEN

AF-61-052-00794
/65- /

DOD-AIR FORCE

••••••••••

GQF 258560 1 FIELD 9+, 9A,20L, 7B

THEORETICAL + EXPERIMENTAL STUDIES ON THEORY + DESIGN OF ACTIVE NETWORKS

A. TONNING

AF-61-052-00484
/65- /

DOD-AIR FORCE

••••••••••

GQF 258904 FIELD 12A

RES. CALCUL., CHESNU, MASSACHUSETTS

COMPUTATIONS + DATA PROCESSING BY AUTOMATIC MACHINES

• NONE

AF-19-628-04439
/65- /

DOD-AIR FORCE

••••••••••

GQF 258923 FIELD 9+,12A

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

EFFORT ON SYNTHESIS PROCEDURES FOR DIGITAL MACHINES VIA ADVANCED DECOMPOSITION TECHNIQUES

• NONE

AF-19-628-05092
/65- /

DOD-AIR FORCE

••••••••••

GQF 258931 FIELD 12A, 9D

METHODS FOR IMPLEMENTATION OF COMPUTER PROGRAM SYNTAX-DIRECTED COMPILATION TECHNIQUES

• NONE

AF-19-628-05091
/65- /

DOD-AIR FORCE

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GQF 258936 FIELD 9+, 9A, 9D,12A

SPACE GENERAL CORP, EL MONTE, CALIFORNIA

FOR BINARY ENCODER DETECTOR DECODER AND AUXILIARY EQUIPMENT FOR EVALUATION OF NEW ERROR - CORRECTING CODES

• NONE

AF-19-628-05115
/65- /

DOD-AIR FORCE

••••••••••

GQF 258949 FIELD 9+, 9A

THEORETICAL INVESTIGATION OF SURFACE WAVES ON LINEAR ARRAY ANTENNA

• NONE

AF-19-628-04984
/65- /

DOD-AIR FORCE

••••••••••

GQF 258950 FIELD 9+, 9A

THEORETICAL + EXPERIMENTAL STUDIES OF ADAPTIVE ANTENNA TECHNIQUES FOR MILLIMETER WAVE APPLICATIONS

• NONE

AF-19-628-05099
/65- /

DOD-AIR FORCE

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GQF 258951 FIELD 9+, 9A

AUBURN UNIVERSITY, GRADUATE SCHOOL, ALABAMA

THEORETICAL + EXPERIMENTAL STUDIES OF CIRCULAR ANTENNA ARRAYS OF RADIAL + TAGENTIAL DIPOLES

J. D. TILLMAN

AF-19-628-04991
/65- /

DOD-AIR FORCE

****

GQF 258956 FIELD 9+, 9A

SPACE GENERAL CORP, EL MONTE, CALIFORNIA

DESIGN + FABRICATION OF PHASE SHIFT AMPLIFIERS FOR USE IN EXPERIMENTAL PHASED ARRAY ANTENNA

. NONE

AF-19-628-05121
/65- /

DOD-AIR FORCE

****

GQF 259001 FIELD 9+,12A, 5C, 9C

RCA RES LAB, PRINCETON, NEW JERSEY

EFFORT ON THE SYNTHESIS ANALYSIS + RELIABILITY OF LOGIC NETWORKS COMPOSED OF THRESHOLD ELEMENTS

R. O. WINDER

AF-19-628-04789
/65- /

DOD-AIR FORCE

****

GQF 259004 FIELD 9+

RCA RES LAB, PRINCETON, NEW JERSEY

THEORET + EXPER EFFORT ON DESIGN OF LOGIC ELEMENTS FOR INTERATIVE ARRAYS W/NON-GALVANIC MOD INPUT

G. B. HERZOG

AF-19-628-04387
/65- /

DOD-AIR FORCE

****

GQF 259017 2 FIELD 9+, 9A,12A, 5C

UNIVAC, BLUE BELL, PENNSYLVANIA

MATH INVEST OF ARRAYS OF ELEMENTS TO DET FUNCTION CAPABILITY + OPTIMUM INTERCONNECTION SCHEMES

L. SPANDORFER

AF-19-628-02907
/65- /

DOD-AIR FORCE

****

GQF 259023 1 FIELD 9+, 9D, 9C

STATE UNIV N Y ALBANY, GRADUATE SCHOOL, NEW YORK

STUDIES ON OPTIMUM MESSAGE TRANSMISSION BY WAVEFORM + ALGERBRAIC ENCODING

P. M. DOLLARD

AF-19-628-03865
/65- /

DOD-AIR FORCE

****

GQF 259028 1 FIELD 9+,12A, 5C, 9C

UNIVAC, BLUE BELL, PENNSYLVANIA

INVEST DESIGN OF NETWORKS CONSISTING OF IDENTICAL LOGIC ELEMENTS AND FOR MAXIMUM LOGIC CAPABILITY

G. KASKEY

AF-19-628-04051
/65- /

DOD-AIR FORCE

****

GQF 259035 FIELD 9+, 9A,12A, 5C

RCA RES LAB, PRINCETON, NEW JERSEY

EFFORT ON EXPLOITATION OF MOS ACTIVE DEVICES FOR INTEGRATED LOGIC NETS + INTERCONNECTION OF ELEMENTS

A. K. RAPP

AF-19-628-04208
/65- /

DOD-AIR FORCE

****

GQF 259042 FIELD 9+, 9A,11G, 9C

MATERIALS STUDY FOR VISUALTRANS-FORMATION DEVICES

. NONE

AF-19-628-04346
/65- /

DOD-AIR FORCE

****

GQF 259083 2 FIELD 9+, 9A,12A, 9C

RCA, MOORESTOWN, NEW JERSEY

THEORETICAL + EXPERIMENTAL STUDY OF TRANSVERSE FEEDS TO IMPROVE THE RADIATION CHARA OF SPHERICAL REFLR

R. C. SPENCER

AF-19-628-02758
/65- /

DOD-AIR FORCE

****

GQF 259084 2 FIELD 9+, 9A

UNIVAC, BLUE BELL, PENNSYLVANIA

THEORETICAL + EXPERIMENTAL STUDY OF IMPROVED ANTENNA ILLUMINATION DISTRIBUTION

P. LOUX

AF-19-628-02759
/65- /

DOD-AIR FORCE

****

GQF 259097 1 FIELD 9+, 9A, 9C,12A

RADIATION INC, MELBOURNE, FLORIDA

THEORETICAL STUDY OF ANTENNA PATTERN SYNTHESIS FOR PLANAR TWO DIMENSIONAL CONFIGURATION

D. R. RHODES

AF-19-628-04007
/65- /

DOD-AIR FORCE

****

GQF 259115 FIELD 9C, 9+, 9A

HUGHES AIRCRAFT CO, CULVER CITY, CALIFORNIA

THEORETICAL STUDY OF AIR + SPACE BORNE ANTENNAS + ARRAYS + OF THE GAIN CHARACTERISTICS OF MANY TYPES

A. VILLENEUVE

AF-19-628-04349
/65- /

DOD-AIR FORCE

****

GQF 435112 FIELD 9+, 9A

MICROWAVE ASSN., BUR, MASSACHUSETTS

SCHOTTKY BARRIER MIXER DIODES

W. MORONEY, W. DOHERTY

AF33-615-02741
/65- /

DOD-AIR FORCE

****

GQF 440181 FIELD 1B, 9C, 9+, 9A

SYSTEMS DESIGN STUDY OF DIRECT + RELAYED RECON DATA TRANSMISSION PROBLEM AREAS

R. ABELE

AF-33-615-02328
/65- /

DOD-AIR FORCE

****

GQF 440252 1 FIELD 15+, 9+,19+,15C

INTERNAT TEL + TEL LBS, NUTLEY, NEW JERSEY

TECHNICAL SERVICES FOR THE ELECTRONIC DEFENSE EVALUATOR

A. H. NIELSEN, C. FLYNN

AF-33-615-2038
/65- /

DOD-AIR FORCE

****

GQF 550349 1 FIELD 12A,13M,20H,20L

DEVELOPMENT OF AN AUTOMATIC DEVICE FOR SOLVING CONTINUUM MECHANICS PROBLEMS

J. G. TRULIO

AF-29-601-6503
/65- /

DOD-AIR FORCE

****

GQF 575102 FIELD 9D,12A, 5C

ADAPTIVE CODING TECHNIQUES

A. FREY, R. BENICE, F. CORR

AF-30-602-3603
/65- /

DOD-AIR FORCE

****

GQN 531223 FIELD 9+, 9C

POWER TRANSFORMATION AND VOLTAGE REGULATION

. NONE

NOW650527
/65- /

DOD-NAVY

****

GQN 531362 FIELD 15+, 9+,15G

TEX. INSTR., INC., D, TEXAS

BACKGROUND DISCRIMINATION TECHNIQUES

. NONE

NOW650260
/65- /

DOD-NAVY

****

GQN 544234 FIELD 9+, 9A,11B

STRAIN INSULATORS FOR LOW FREQUENCY TOWERS 50-150 KILOCYCLES

. NONC

NAY62174
/65- /

DOD-NAVY

****

GQQ 8801 FIELD 12A, 9D, 5C

COMPUTER NETWORK AND TIME-SHARING RESEARCH

R. C. SPROWLS

SD-184
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

****

GQQ 8802 FIELD 12A, 9D

COMPUTER NETWORK AND TIME-SHARING RESEARCH

R. C. SPROWLS

SD-184
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

****

GQQ 8804 FIELD 12A, 9D

COMPUTER NETWORK AND TIME-SHARING RESEARCH

R. C. SPROWLS

SD-184
/65- /

DEFENSE-ADVANCED RES PROJECTS AGENCY

10 ENERGY CONVERSION (NON-PROPULSIVE)

****

GQF 259377 1 FIELD 7D, 9+, 9C, 9A

UNIV OF NOTRE DAME, GRADUATE SCHOOL, PHYSICS, INDIANA

RESEARCH ON THERMIONIC CONVERTER ELECTRODES

E. A. COOMES

AF-19-628-04063
/65- /

DOD-AIR FORCE

****

GQF 259389 FIELD 9C, 9A,20L

LITTON SYSTEMS INC, ST PAUL, MINNESOTA

RESEARCH ON THE THERMIONIC CONVERT ELECTRODE SURFACES USING THE ELECTRON MIRROR MICROSCOPE

K. N. MAFFITT

AF-19-628-04302
/65- /

DOD-AIR FORCE

****

GQF 259390

THERMO ELECTRON ENGR, MASSACHUSETTS

RESEARCH ON OPTIMUM EMITTER CAVITIES TO BE USED IN THERMIONIC ENERGY CONVERTERS

G. HATSOPOULOS

AF-19-628-04322
/65- /

DOD-AIR FORCE

11 MATERIALS

****

GQF 6951 1 FIELD 11G,11D

PENNSYLVANIA ST UNIV, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, PENNSYLVANIA

DISPERSION HARDENING

M. C. INMAN

AF-AFOSR-0669-65
/65- /

DOD-AIR FORCE

****

GQF 207375 3 FIELD 7D,11B, 7B

BATTELLE MEMORIAL IN, OHIO

DEV AND APPL OF METHODS FOR ANALYSES OF SELECTED METALLURGICAL AND CERAMIC RESEARCH MATERIAL

W. M. HENRY

AF-33-657-08108
/65- /

DOD-AIR FORCE

****

GQF 284668 4 FIELD 11G

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

MECHANISMS OF REVERSIBLE AND IRREVERSIBLE LOSS OF MECHANICAL PROPERTIES OF ELASTOMERS AT ELEVATED TEMPERATURES

T. SMITH

AF-33-657-08186
/65- /

DOD-AIR FORCE

****

GQF 284677 3 FIELD 11B,11H,11G,12A

MIDWEST RES INST KAN, MISSOURI

FRICTION AND WEAR BEHAVIOR OF SOLID FILMS

P. J. BRYANT

AF-33-657-10122
/65- /

DOD-AIR FORCE

****

GQF 284693 2 FIELD 11F,11G, 7B

UNIV OF THE SAARLANDES, GERMANY

PHYSICAL PROPERTIES OF INTERSTITIAL-FREE IRON AND IRON ALLOYS

H. J. SEEMAN

AF-61-052-00632
/65- /

DOD-AIR FORCE

****

GQF 284694 1 FIELD 11B,11D,11F,13H

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

PREPARATION AND INVESTIGATION OF HIGH STRENGTH WIRES STRUCTURE

K. L. MOAZED

AF-33-615-01717
/65- /

DOD-AIR FORCE

****

GQF 284695 2 FIELD 11G

FUNDAMENTAL MECHANISMS OPERATIVE IN THE FATIGUE FAILURE OF METALS

S. WEISSMANN

AF-33-657-10873
/65- /

DOD-AIR FORCE

****

GQF 284696 3 FIELD 11F,11G

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, OHIO

BRITTLE-DUCTILE TRANSITION IN FACE-CENTERED CUBIC ALLOYS

A. R. TROIANO

AF-33-657-08244
/65- /

DOD-AIR FORCE

****

GQF 284697 3 FIELD 11F,11G

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

DISLOCATION INTERACTIONS AND EXTENSIONS AND STACKING FAULTS IN RELATION TO MECHANICAL PROPERTIES OF METALS AND ALLOYS

R. SPEISER

AF-33-657-08690
/65- /

DOD-AIR FORCE

****

GQF 284698 2 FIELD 11F,11G

UNIV OF KENTUCKY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, KENTUCKY

SOFTENING CHARACTERISTICS OF DISPERSION FORMING ALLOY SYSTEMS

J. G. MORRIS

AF-33-615-01075
/65- /

DOD-AIR FORCE

****

GQF 284701 2 FIELD 11F,13H,11G

MARTIN CO BALTIMORE, MARYLAND

EFFECT OF SURFACE ON THE MECHANICAL PROPERTIES OF METALS

I. R. KRAMER

AF-33-657-10509
/65- /

DOD-AIR FORCE

****

GQF 284703 1 FIELD 11B,11C,11F,11G

MIDWEST RES INST KAN, MISSOURI

SUPPRESSION OF FATIGUE CRACKING THRU CONTROL OF SURFACE CONDITIONS

J. C. KREUTZ

AF-33-615-01702
/65- /

DOD-AIR FORCE

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GQF 284709 2 FIELD 11F,13H,11G

MULTIPHASE DIFFUSION IN THREE-COMPONENT METALLIC SYSTEMS

A. G. GUY

AF-33-615-01077
/65- /

DOD-AIR FORCE

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GQF 284711 3 FIELD 11F,13H,11G

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

EUTECTOID REACTIONS IN METALS AND ALLOYS

G. W. POWELL

AF-33-657-08815
/65- /

DOD-AIR FORCE

••••••••••

GQF 284949 FIELD 5A,11F,11G

UNIV OF WALES, UNITED KINGDOM

MECHANICAL PROPERTIES OF TANTALUM AND MOLYBDENUM ALLOYS

B. L. MORDIKE

AF-61-052-00872
/65- /

DOD-AIR FORCE

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GQF 284956 FIELD 11B

TECH HIGH SCH MUNICH, GERMANY

EXPERIMENTAL INVESTIGATION OF THE BEHAVIOR OF BRITTLE MATERIALS AT VARIOUS TEMPERATURE RANGES

H. NEUBER

AF-61-052-00875
/65- /

DOD-AIR FORCE

••••••••••

GQF 284961 1 FIELD 11G

TECH HIGH SCH MUNICH, GERMANY

THERMAL FATIGUE

H. NEUBER

AF-61-052-00718
/65- /

DOD-AIR FORCE

••••••••••

GQF 284962 FIELD 11D,11F,13H,11G

UNITED AIRCRAFT RES., CONNECTICUT

IMPACT RESISTANCE OF UNIDIRECTIONALLY SOLIFIED BINARY EUTECTIC ALLOYS

J. A. FORD

AF-33-615-02672
/65- /

DOD-AIR FORCE

••••••••••

GQF 284969 1 FIELD 11G

AEON LABORATORIES, UNITED KINGDOM

METALLOGRAPHY OF SOME DISPERSION HARDENED ALLOYS

J. A. COILEY

AF-61-052-00767
/65- /

DOD-AIR FORCE

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GQF 386504 FIELD 21B, 7D,11G, 7B

ATLANTIC RESEARCH CORP, VIRGINIA

EFFECT OF LONG DURATION EXPOSURES TO PURE OXYGEN AT REDUCED PRESSURE ON MATERIAL

C. HUGGETT

AF41-609-02478
/65- /

DOD-AIR FORCE

••••••••••

GQF 475247 FIELD 11G,11D,20L,20K

USDA, MADISON, WISCONSIN

STRUCTURAL COMPOSITE SANDWICH

E. W. KUENZI, P. H. JENKINSON

D-D-33-615-65-5002
/65- /

DOD-AIR FORCE

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GQF 500238 3 FIELD 5A,11F,11G

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, METALLURGICAL ENGIN, OHIO

INVESTIGATION OF ANELASTIC BEHAVIOR IN METALS

J. W. SPRETNAK, J. C. BISSELICHES
D. T. PETERS

AF-33-657-07656
/65- /

DOD-AIR FORCE

••••••••••

GQN 544105 5 FIELD 11F,13H,11G

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

WELDING PROCEDURES

W. H. MUNSE

NBY24976
/65- /

DOD-NAVY

12 MATHEMATICAL SCIENCES

••••••••••

GQF 6797 1 FIELD 12A,20H,20L

PHYSICS ENGR CHEM INC, BOULDER, COLORADO

COMPUTER EVALUATION OF THE CHARACTERS OF THE SPACE GROUPS

S. C. MILLER

AF-49-638-01394
/65- /

DOD-AIR FORCE

••••••••••

GQF 6886 1 FIELD 12A

ILLINOIS INST OF TECH, GRADUATE SCHOOL, MATHEMATICS, ILLINOIS

THEOREM PROVING BY COMPUTER

B. KALLICK

AF-49-638-01458
/65- /

DOD-AIR FORCE

••••••••••

GQF 207040 2 FIELD 12A

UNIVERSITY OF ROME, ITALY

RESEARCH ON FUNCTIONAL ANALYSIS AND INTEGRAL EQUATIONS

G. FICHERA

AF-EOAR-0050-64
/65- /

DOD-AIR FORCE

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GQF 207533 FIELD 12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

APPLIED CLASSICAL ANALYSIS

H. FETTIS

/65- /

DOD-AIR FORCE

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GQF 207534 FIELD 12A,13M,20D,10B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

VARIATIONA PROBLEMS

K. GUDERLEY

/65- /

DOD-AIR FORCE

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GQF 207542 FIELD 12A,15C,15G

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ANALYSIS OF VARIANCE AND PROBABILITY

M. LOM

/65- /

DOD-AIR FORCE

••••••••••

GQF 207545 FIELD 12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RANKING AND SELECTION PROCEDURES

D. BARR

/65- /

DOD-AIR FORCE

••••••••••

GQF 207547 FIELD 12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDIES IN APPROXIMATION THEORY AND OTHER TOPICS IN REAL AND COMPLEX ANALYSIS

O. SHISTA

/65- /

DOD-AIR FORCE

••••••••••

GQF 207549 FIELD 12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

APPLICATIONS OF FUNCTIONAL ANALYSIS

C. KELLER

/65- /

DOD-AIR FORCE

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GQF 207550 FIELD 12A, 5C

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

MATHEMATICAL PROGRAMMING GAME THEORY AND INEQUALITIES

B. MOND

/65- /

DOD-AIR FORCE

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GQF 258553 1 FIELD 9+, 9A,12A, 9C

UNIVERSITY OF ILLINOIS, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, ILLINOIS

THEORETICAL STUDY OF THE MATRIX PRESENTATION OF BOUNDARY VALUE PROBLEM SOLUTIONS

R. MITTRA

AF-19-628-03819
/65- /

DOD-AIR FORCE

13 MECHANICAL, INDUSTRIAL, CIVIL, AND MARINE ENGINEERING

•••••••••

GQF 207526 FIELD 12A,13M,20D,10B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

THEORETICAL INVESTIGATION OF SUPERSONIC COMPRESSOR BLADING

A. WENNERSTROM

/65- /

DOD-AIR FORCE

•••••••••

GQF 420563 FIELD 20D,10B

EJECTOR PERFORMANCE IN CONTINUUM AND NON-CONTINUUM FLOW

R. C. GERMAN, R. C. BAUER

AF-40-600-1000
/65- /

DOD-AIR FORCE

14 METHODS AND EQUIPMENT

•••••••••

GQF 6798 1 FIELD 11B, 5A,20L, 7B

THE AFOSR INSTITUTE FOR THE STUDY OF MATTER

B. T. MATTHIAS

AF-AFOSR-0631-64
/65- /

DOD-AIR FORCE

•••••••••

GQF 207064 3 FIELD 20D,10B

CORNELL AERONAUT. LA, NEW YORK

RESEARCH ON ADVANCED GAS DYNAMIC TEST FACILITIES

A. HERTZBERG

AF-33-657-08860
/65- /

DOD-AIR FORCE

•••••••••

GQF 207528 FIELD 13+, 9+, 9C, 9A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON WIND TUNNEL COMPONENTS

D. MOORE

/65- /

DOD-AIR FORCE

•••••••••

GQF 207532 FIELD 20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH FACILITY TECHNIQUES AND USE

E. JOHNSON

/65- /

DOD-AIR FORCE

•••••••••

GQF 258125 1 FIELD 22C,13B, 8F, 8N

UNIV OF UPPSALA, SWEDEN

RESEARCH + DEVELOPMENT OF LARGE + SMALL MODELS OF DOUBLE SLIT MICHELSON-TYPE INTERFEROMETERS

E. TENGSTROM

AF-61-052-00766
/65- /

DOD-AIR FORCE

•••••••••

GQF 258160 1 FIELD 6B, 9+, 9A,18A

DESIGN DEVELOP AND CONSTRUCT CHARGED PARTICLE MEASURING SYSTEMS

. NONE

AF-19-628-03896
/65- /

DOD-AIR FORCE

•••••••••

GQF 258470 2 FIELD 15+, 9+

DESIGN + DEVELOPMENT OF MOISTURE CONTENT MONITORING INSTRUMENTS

A. H. ZEMANIAN

AF-19-628-02981
/65- /

DOD-AIR FORCE

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GQF 258617 1 FIELD 22B,22A,17G, 3A

AMER SC + ENGR CO, MASSACHUSETTS

REBUILD AND REFURBISH DAMAGED X-RAY DETECTOR SYSTEM

H. GURSKY

AF-19-628-04052
/65- /

DOD-AIR FORCE

•••••••••

GQF 258621 1 FIELD 7D, 5A,20F

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

HIGH RESOLUTION INFRARED SPECTROSCOPY USING INTERFEROMETRIC GRATING AND MODULATION METHODS

T. K. MCCUBBIN

AF-19-628-03846
/65- /

DOD-AIR FORCE

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GQF 258925

PROVIDE MAINTAINANCE SERVICES + SUPPLIES FOR AFCRL POP-1C-36

. NONE

AF-19-628-04699
/65- /

DOD-AIR FORCE

•••••••••

GQF 259610 1 FIELD 9+

TECHNICAL OPERATIONS, MASSACHUSETTS

ESTABLISH FEASIBILITY DESIGN BUILD + OPERATE ELECTRONIC DETECTOR FOR FRINGE VISIBILITY MEASUREMENT

. NONE

AF-19-628-05145
/65- /

DOD-AIR FORCE

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GQF 259777 1 FIELD 6B, 9+

MCPHERSON INSTUMENT, MASSACHUSETTS

PROVIDE COMPLETE INSTALLATION OF A GRAZING-INCIDENCE VACUM MONOCHROMATOR

. NONE

AF-19-628-03271
/65- /

DOD-AIR FORCE

•••••••••

GQF 260441 FIELD 6B, 9+

DESIGN + CONSTRUCT A COMBINED ELECTRON MICROSCOPE + X-RAY ANALYZER

R. OGILVIE

AF-19-628-05179
/65- /

DOD-AIR FORCE

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GQF 420569 FIELD 15+, 9+, 9A,10B

NORTH AMER AVIATION, CANOGA PARK, CALIFORNIA

RESEARCH LEADING TO THE DEVELOPMENT OF A DUAL RANGE PRESSURE TRANSDUCER

R. W. POSTMA, J. V. HOBBS

AF-40-600-1134
/65- /

DOD-AIR FORCE

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GQN 530476 1 FIELD 1C, 5E,10B

TECHNICAL AND ENGINEERING SERVICES

. NONE

NOW640509
/65- /

DOD-NAVY

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GQN 544110 5 FIELD 21B,21I, 7D, 7A

HIGH SPEED DETECTOR DEVICE

J. B. SMITH, E. W. CRAY

NBY24974
/65- /

DOD-NAVY

15 MILITARY SCIENCES

••••••••••

GQF 6883 1 FIELD 12A, 9D, 5C,15C

NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, INDUSTRIAL ENGINEERING, NEW YORK

MODELS FOR ANALYZING INFORMATION AND COMMAND SYSTEMS

E. D. HOMER

AF-AFOSR-0621-65
/65- /

DOD-AIR FORCE

16 MISSILE TECHNOLOGY

••••••••••

GQF 259072 3 FIELD 22B,22A,22D, 9C

NORTHEASTERN UNIV, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, MASSACHUSETTS

DESIGN-FABRICATION OF FOUR NIKECAJUN EXPERIMENTAL PAYLOADS TO DETERMINE ANTENNA BREAKDOWNS

J. S. ROCHEFORT

AF-19-628-00479
/65- /

DOD-AIR FORCE

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GQF 259185 2 FIELD 22B,17G, 9C,15+

SPACE GENERAL CORP, EL MONTE, CALIFORNIA

DESIGN + DEV OF AN ATTITUDE CONTROL SYSTEM PROGRAMMER FOR AEROBEE SOUNDING ROCKETS

. NONE

AF-19-628-02963
/65- /

DOD-AIR FORCE

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GQF 259579 2 FIELD 20M,20J,18A,20D

PHYSICAL STUDIES, OHIO

MISSILE NOSECONE REENTRY RADIATION STUDIES BY OPTICAL EQUIPMENT ON GEMINI VEH

R. G. BREENE

AF-19-628-05137
/65- /

DOD-AIR FORCE

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GQF 420559 3 FIELD 20D,20K

PRESSURE FLUCTUATION PHENOMENA FOR BASIC MISSILE SHAPES AT TRANSONIC SPEEDS

J. E. ROBERTSON

AF-40-600-01000
/65- /

DOD-AIR FORCE

17 NAVIGATION, COMMUNICATIONS DETECTION AND COUNTERMEASURES

••••••••••

GQF 6747 1 FIELD 17G,12A,22C, 9D

COMPUTATION OF OPTIMAL CONTROLS

E. G. GILBERT

AF-AFOSR-0814-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 258947 FIELD 9+

CONDUCTION CORP, MICHIGAN

THEORETICAL + EXPERIMENTAL STUDIES OF RADAR REFLECTION + SCATTERING FROM SHAPED OBJECTS

. NONE

AF-19-628-05045
/65- /

DOD-AIR FORCE

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GQF 259002 FIELD 6B, 9+, 9D, 5C

UNIV OF VIENNA, AUSTRIA

INVEST METHODOLOGY FOR ASSESSING RATING VOICE QUALITY IN A VOICE COMMUNICATION CHANNEL

I. G. URBNEK

AF-61-052-00856
/65- /

DOD-AIR FORCE

••••••••••

GQF 260636 FIELD 9+

RCA, CAMDEN, NEW JERSEY

PROCUREMENT OF VIDEO TAPE STOP MOTION BROADCAST QUALITY-QUADRUPLEXTYPE

. NONE

AF-19-628-05169
/65- /

DOD-AIR FORCE

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GQN 530889 FIELD 15+, 9+,12A,15G

MISSILE GUIDANCE AND CONTROL ADAPTIVE SYSTEMS

. NONC

NDW6206040
/65- /

DOD-NAVY

18 NUCLEAR SCIENCE AND TECHNOLOGY

••••••••••

GQF 103965 1 FIELD 5A

ISOTOPES INC WESTWOOD, NEW JERSEY

PROJECT VELA CLOUD GAP

L. KULP

AF-49-638-01590
/65- /

DOD-AIR FORCE

••••••••••

GQF 207557 FIELD 12A,20H,18A, 7D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

INVESTIGATION OF NUCLEAR LEVAL SCHEMES

G. HARRIS

/65- /

DOD-AIR FORCE

••••••••••

GQF 207558 FIELD 6B,18A, 7D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

APPLICATION OF THE INTERNAL CONVERSION PROCESS TO NUCLEAR SPECTROSCOPY

H. HENNECKE

/65- /

DOD-AIR FORCE

19 ORDNANCE

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GQF 207483 FIELD 7C,19D,21B,21D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

INVESTIGATION OF KINETIC MECHANISMS IN GASEOUS DETONATIONS

K. SCHELLER

/65- /

DOD-AIR FORCE

20 PHYSICS

••••••••••

GQF 346 8 FIELD 12A,13M,20D,20K

THIN ELASTIC SHELLS AND BOUNDARY VALUE PROBLEMS AND NON-LINEAR ELASTICITY

P. M. QUINLAN

AF-EOAR-0040-65
/65- /

DOD-AIR FORCE

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GQF 368 8 FIELD 5A,18A,20H

JOHNS HOPKINS UNIV, GRADUATE SCHOOL, PHYSICS, MARYLAND

INVESTIGATIONS OF NEW PARTICLES AND THEIR INTERACTIONS WITH NUCLEONS

A. PEVSNER

AF-AFOSR-0234-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 433 10 FIELD 20M,12A,20H,20F

UNIV OF LEIDEN, NETHERLANDS

THERMODYNAMICS OF IRREVERSIBLE PROCESSES

S. R. DEGROOT

AF-EOAR-0099-62
/65- /

DOD-AIR FORCE

****

GQF 623 9 FIELD 20J, 5A,20F,20L

SYRACUSE UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

MAGNETIC RESONANCE IN SEMICONDUCTORS

A. HONIG

AF-AFOSR-0425-63
/65- /

DOD-AIR FORCE

****

GQF 807 5 FIELD 12A,13M,20D

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

RESEARCH IN FLUID DYNAMICS

H. P. GREENSPAN

AF-AFOSR-0492-64
/65- /

DOD-AIR FORCE

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GQF 934 6 FIELD 12A,20M,20J, 5A

UNIV OF ROCHESTER, GRADUATE SCHOOL, PHYSICS, NEW YORK

EFFECTS OF COHERENCE IN ELECTROMAGNETIC RADIATION

E. WOLF

AF-AFOSR-0237-65
/65- /

DOD-AIR FORCE

****

GQF 952 6 FIELD 9+

THE PROPERTIES OF LASER DEVICES

G. GOULD

AF-49-638-01535
/65- /

DOD-AIR FORCE

****

GQF 956 5 FIELD 18A,20H

UNIV OF VIENNA, AUSTRIA

HIGH ENERGY PARTICLE RESONANCES CROSS-SECTIONS AND SYMMETRIES

W. E. THIRRING

AF-61-052-00644
/65- /

DOD-AIR FORCE

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GQF 989 6 FIELD 20L,20K

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MASSACHUSETTS

RANDOM VIBRATION IN AEROSTRUCTURES

S. H. CRANDALL

AF-49-638-01314
/65- /

DOD-AIR FORCE

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GQF 1013 5 FIELD 20L

PENNSYLVANIA ST UNIV, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, PENNSYLVANIA

THERMAL EFFECTS IN CONTINUUM MECHANICS

W. JAUNZEMIS

AF-49-638-01425
/65- /

DOD-AIR FORCE

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GQF 1030 6 FIELD 5A,20F,20L, 7B

UNIV OF CAL-BERKELEY, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

ELECTRONIC STRUCTURE OF METALS

A. F. KIP

AF-AFOSR-0290-63
/65- /

DOD-AIR FORCE

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GQF 1041 7 FIELD 11F,11G

JOHNS HOPKINS UNIV, SCHOOL OF ENGINEERING, MECHANICS, MARYLAND

PLASTIC WAVE PROPAGATIONS IN METALS AT ELEVATED TEMPERATURES

J. F. BELL

AF-49-638-01067
/65- /

DOD-AIR FORCE

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GQF 1047 6 FIELD 20M, 5A,20L, 7B

MICHIGAN STATE UNIV, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MICHIGAN

MAGNETIC SYSTEMS AT LOW TEMPERATURES

R. D. SPENCE

AF-AFOSR-0430-63
/65- /

DOD-AIR FORCE

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GQF 1050 5 FIELD 20L, 7B

UNIV OF MINNESOTA, GRADUATE SCHOOL, CHEMISTRY, MINNESOTA

POINT DEFECT STUDIES IN GROUP II-VI COMPOUNDS

J. E. WERTZ

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/65- /

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GQF 1068 6 FIELD 20L,20K

POLYTECH INST BROOKLYN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, NEW YORK

DYNAMICS AND VIBRATIONS OF PLATES AND SHELLS

Y. YIYUAN

AF-49-638-01290
/65- /

DOD-AIR FORCE

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GQF 1105 5 FIELD 20M,20F,20L,20J

MICROWAVE STUDIES OF SEMICONDUCTING CRYSTALS

K. S. CHAMPLIN

AF-AFOSR-0606-64
/65- /

DOD-AIR FORCE

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GQF 1111 5 FIELD 20M, 4A,18A,20H

UNIV OF SYDNEY, AUSTRALIA

NUCLEAR INTERACTIONS AT ENERGIES GREATER THAN 1000 BEV

C. B. MCCUSKER

AF-AFOSR-0305-63
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GQF 1115 5 FIELD 20D,20F,20I, 7B

CAL INST OF TECHNOLOGY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, CALIFORNIA

GROWTH OF BOUNDARY LAYERS IN PLASMA ACCELERATORS

F. E. MARBLE

AF-49-638-01285
/65- /

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GQF 1142 5 FIELD 7D,20M,20D, 7B

CORNELL AERONAUT. LA, NEW YORK

BOUNDARY LAYERS IN HIGH TEMPERATURE FLOWS

A. L. MYERSON

AF-49-638-01487
/65- /

DOD-AIR FORCE

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GQF 1145 5 FIELD 9+, 9C, 5A,20L

ARIZONA STATE UNIV, GRADUATE SCHOOL, PHYSICS, ARIZONA

ELECTRICAL PROPERTIES OF OXIDES OF LANTHANIDE RARE EARTH ELEMENTS

C. J. KEVANE

AF-AFOSR-0609-65
/65- /

DOD-AIR FORCE

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GQF 1146 5 FIELD 5A,20D,20L, 7B

UNIVERSITY OF ARIZONA, GRADUATE SCHOOL, PHYSICS, ARIZONA

PHYSICAL PROPERTIES OF SOLIDS AT HIGH PRESSURE

C. T. TOMIZUKA

AF-AFOSR-0105-63
/65- /

DOD-AIR FORCE

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GQF 1183 5 FIELD 5A,20I

CAL INST OF TECHNOLOGY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, CALIFORNIA

PLASMA DYNAMICS

R. W. GOULD, R. W. GOULD

AF-49-638-01462
/65- /

DOD-AIR FORCE

****

GQF 1195 5 FIELD 20I

UNIV OF TORONTO, GRADUATE SCHOOL, CANADA

PLASMA DYNAMICS AND MAGNETOGASDYNAMICS

J. H. DELEEUW

AF-AFOSR-0366-65
/65- /

DOD-AIR FORCE

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GQF 1281 5 FIELD 3C, 3A, 8N, 8G

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, MARYLAND

DETECTION AND GENERATION OF GRAVITY WAVES

J. WEBER

AF-AFOSR-0409-65
/65- /

DOD-AIR FORCE

****

GQF 1300 5 FIELD 11G

COLUMBIA UNIVERSITY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, NEW YORK

BASIC PROBLEMS IN DISLOCATION THEORY

J. H. WEINER

AF-AFOSR-0228-63
/65- /

DOD-AIR FORCE

****

GQF 2107 4 FIELD 12A,20H,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

APPLICATIONS OF GLOBAL ANALYSIS TO MODERN THEORETICAL PHYSICS

I. E. SEGAL

AF-AFOSR-0342-64
/65- /

DOD-AIR FORCE

****

GQF 2243 4 FIELD 20M,20D

STANFORD UNIVERSITY, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, CALIFORNIA

HYPERSONIC AND VISCOUS FLOW THEORY

M. D. VANDYKE

AF-49-638-01274
/65- /

DOD-AIR FORCE

****

GQF 2245 4 FIELD 20M, 5A

UNIV OF VT + ST AGRIC, GRADUATE SCHOOL, PHYSICS, VERMONT

NONLINEAR SONIC PHENOMENA

W. L. NYBORG

AF-AFOSR-0062-63
/65- /

DOD-AIR FORCE

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GQF 2246 4 FIELD 20L, 7B

VIRG INST FOR SCIENT, VIRGINIA

GROWTH AND PERFECTION OF SINGLE CRYSTALS OF THE RARE EARTHS AND ALKALI METAL COBALT

J. F. KIRN

AF-AFOSR-0294-63
/65- /

DOD-AIR FORCE

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GQF 2309 4 FIELD 20L,20K

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, MASSACHUSETTS

STATIC AND DYNAMIC NONLINEAR STRUCTURAL PROBLEMS

T. H. PIAN

AF-AFOSR-0347-64
/65- /

DOD-AIR FORCE

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GQF 2371 4 FIELD 11F,11G, 5A

UNIV OF NORTH DAKOTA, GRADUATE SCHOOL, PHYSICS, NORTH DAKOTA

RESIDUAL STRESSES IN SILVER RESULTING FROM STRAIN DISTORTION AROUND IMPURITIES

F. A. WHALIN

AF-AFOSR-0189-63
/65- /

DOD-AIR FORCE

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GQF 2373 4 FIELD 7D

UNIV OF SAO PAULO, BRAZIL

DEUTERON AND PROTON REACTIONS AT 3.5 MEV.

O. SALA

AF-AFOSR-0310-65
/65- /

DOD-AIR FORCE

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GQF 2389 3 FIELD 12A,20H,20J

UNIV OF LONDON, UNITED KINGDOM

STUDIES OF ELEMENTARY PARTICLE THEORY BY APPLICATION OF DISPERSION RELATIONSHIPS

H. MASSIE

AF-EOAR-0062-64
/65- /

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GQF 2393 4 FIELD 11F,11G, 5A,20L

UNIVERSITY OF ILLINOIS, GRADUATE SCHOOL, PHYSICS, ILLINOIS

IMPERFECTIONS IN SOLIDS

R. M. THOMSON

AF-AFOSR-0803-65
/65- /

DOD-AIR FORCE

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GQF 2399 4 FIELD 12A,13M,20D

VON KARMAN INST FL DYN, BELGIUM

KINETIC THEORY OF GASES

J. J. SMOLDEREN

AF-EOAR-0049-65
/65- /

DOD-AIR FORCE

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GQF 2631 4 FIELD 9+, 5A,20F,20L

SUBMILLIMETER RADIATION FROM RELATIVISTIC ELECTRONS

R. N. WHITEHURST

AF-AFOSR-0295-63
/65- /

DOD-AIR FORCE

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GQF 2652 4 FIELD 20M, 5A,11F,11G

PRINCETON UNIVERSITY, GRADUATE SCHOOL, NEW JERSEY

THERMAL EFFECTS IN SOLIDS

O. W. DILLON

AF-49-638-01306
/65- /

DOD-AIR FORCE

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GQF 2694 4 FIELD 20I

ELECTRO-OPTIC SYSTEMS, PASADENA, CALIFORNIA

PLASMA DIAGNOSTICS IN CROSSED-FIELD ACCELLERATOR

M. R. DENISON

AF-49-638-01063
/65- /

DOD-AIR FORCE

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GQF 2782 3 FIELD 20D

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

EFFECT OF BODY FORCES ON THE MOTION AND HEAT TRANSFER OF CONFINED FLUIDS

S. OSTRACH

AF-AFOSR-0194-66
/65- /

DOD-AIR FORCE

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GQF 2783 3 FIELD 5A,18A,20H

CATHOLIC UNIV OF AMER, GRADUATE SCHOOL, PHYSICS, DIST OF COLUMBIA

WEAK INTERACTIONS MU-MESON PHYSICS AND THEORY OF LIGHT NUCLEI

C. WERNTZ

AF-AFOSR-0566-64
/65- /

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GQF 2846 3 FIELD 20J,20I,20L, 7B

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

MAGNETO GAS DYNAMICS

P. F. MAEDER

AF-49-638-01295
/65- /

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GQF 2893 3 FIELD 7D,11F,11G,20J

BATTELLE MEMORIAL IN, OHIO

FUNDAMENTAL STUDIES OF DIFFUSION

A. E. AUSTIN

AF-AFOSR-0262-63
/65- /

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GQF 2895 3 FIELD 20J, 5A,20F,20L

PENNSYLVANIA ST UNIV, GRADUATE SCHOOL, PHYSICS, PENNSYLVANIA

SURFACE POTENTIAL AND BAND STRUCTURE OF METALS

P. H. CUTLER

AF-AFOSR-0213-63
/65- /

DOD-AIR FORCE

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GQF 3109 3 FIELD 20D,10B

AEROCHEM. RES. LAB., NEW JERSEY

INTERFACIAL RATE PROCESSES IN FLOW SYSTEMS

D. ROSNER

AF-49-638-01138
/65- /

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GQF 3160 3 FIELD 5A,20F,20L, 78

UNIVERSITY OF OREGON, GRADUATE SCHOOL, PHYSICS, OREGON

MICROWAVE AND OPTICAL PROPERTIES OF CRYSTALS

J. C. KEMP

AF-AFOSR-0577-64
/65- /

DOD-AIR FORCE

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GQF 3174 3 FIELD 20M,20L, 78

LOW TEMPERATURE THERMAL AND ELECTRICAL PROPERTIES OF CRYSTALS

G. K. HORTON

AF-AFOSR-0726-65
/65- /

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GQF 3251 3 FIELD 20D,20K

UNIV OF CAL-BERKELEY, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, CALIFORNIA

THREE DIMENSIONAL SUPERSONIC AND HYPERSONIC FLOW PROBLEMS PANEL FLUTTER OF CYLINDRICAL SHELLS

M. HOLT

AF-AFOSR-0268-65
/65- /

DOD-AIR FORCE

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GQF 3292 3 FIELD 11F,11G, 5A,20L

CLARKSON COL OF TECH, GRADUATE SCHOOL, PHYSICS, NEW YORK

HEAT TREATMENT EFFECTS ON SOME PHYSICAL PROPERTIES OF METALLIC SINGLE CRYSTALS

M. C. MARTIN

AF-AFOSR-0794-65
/65- /

DOD-AIR FORCE

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GQF 3301 2 FIELD 20M,20L, 78

MAGNETO-ACOUSTIC ABSORPTION IN SOLIDS

J. TRIVISONNO

AF-AFOSR-0862-65
/65- /

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GQF 3327 3 FIELD 20I

COLUMBIA UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRONICS RES LAB, NEW YORK

DIAGNOSTIC STUDY OF THE FLUID TRANSPIRATION ARC

C. SHEER

AF-49-638-01395
/65- /

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GQF 3361 3 FIELD 20D,10B

GENERAL ELECTRIC CORP, PHILADELPHIA, PENNSYLVANIA

DENSITY PROFILE MEASUREMENTS

P. GLOERSEN

AF-49-638-01578
/65- /

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GQF 3380 2 FIELD 20M,20L,20D

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MATHEMATICS, MICHIGAN

RELAXATION HYDRO-DYNAMICS OF CHARGED COMPRESSIBLE AND INCOMPRESSIBLE PERFECT FLUIDS

N. COBURN

AF-AFOSR-0020-63
/65- /

DOD-AIR FORCE

••••••••••

GQF 3418 1 FIELD 20M,20D,20L, 78

UNIVERSITY OF LOUVAIN, BELGIUM

INFLUENCE OF HIGH PRESSURE ON THE ELECTRICAL PROPERTIES OF GERMANIUM

A. VANITTERBEEK

AF-EOAR-0040-63
/65- /

DOD-AIR FORCE

••••••••••

GQF 3441 2 FIELD 20F

OPTICS TECHNOLOGY INC, BELMONT, CALIFORNIA

DIFFRACTION AND COHERENCE PHENOMENA IN OPTICAL WAVEGUIDES

N. S. KAPANY

AF-49-638-01200
/65- /

DOD-AIR FORCE

••••••••••

GQF 3445 2 FIELD 7C, 7D,20F,20I

MICROWAVE INVESTIGATION OF IONIZATION IN GASEOUS DISCHARGES

N. C. SEXTON

AF-EOAR-0046-65
/65- /

DOD-AIR FORCE

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GQF 3451 2 FIELD 20D,10B

VON KARMAN INST FL DYN, BELGIUM

LOW DENSITY HIGH TEMPERATURE GAS DYNAMICS

J. J. SMOLDEREN

AF-EOAR-0013-65
/65- /

DOD-AIR FORCE

••••••••••

GQF 3464 2 FIELD 20M,11G, 5A,20L

POLYTECH INST BROOKLYN, GRADUATE SCHOOL, PHYSICS, NEW YORK

DISORDER IN CRYSTALS

B. POST

AF-AFOSR-0248-63
/65- /

DOD-AIR FORCE

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GQF 3465 2 FIELD 20D,20F,20L, 78

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

FEASIBILITY OF PHONON DIFFRACTION IN LIQUID HELIUM

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IBM RESEARCH CENTER, NEW YORK

VAPOR-SOLVENT GROWTH OF SEMICONDUCTING CRYSTALS

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ISR INST OF TECHNOLOGY, ISRAEL

SUPERPARAMAGNETIC BEHAVIOR OF SOLIDS AT LIQUID HELIUM TEMPERATURES

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SURFACE STUDIES BY SLOW ELECTRON DIFFRACTION

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ELEMENTARY PARTICLE PHYSICS

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TOROIDAL PLASMA CONTAINMENT

H. C. LOOS

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NONLINEAR DISTURBANCES IN UNSTABLE VISCOUS FLUID FLOW

L. ARNOLD

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SYRACUSE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, NEW YORK

INTERACTION OF PLASMAS WITH HIGH INTENSITY R-F FIELDS

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PROPERTIES OF ACCELERATED PLASMAS

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GQF 3592 2 FIELD 20D,10B

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UNITED AIRCRAFT RES., CONNECTICUT

NON-EQUILIBRIUM IONIZATION

R. H. BULLIS

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MAGNETIC INTERACTIONS IN DILUTE ALLOYS

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SURFACE STATES IN PURE PALLADIUM

R. W. ZUEHLKE

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EXPERIMENTAL STUDY OF THERMAL CONDUCTIVITY

G. SIMMONS

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GQF 3660 2 FIELD 5A,20F,20I,20D

VANDERBILT UNIVERSITY, GRADUATE SCHOOL, PHYSICS + ASTRONOMY, TENNESSEE

EXPERIMENTS ON PLASMA STRUCTURE

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INTERACTION PHENOMENA IN ROTATIONAL STREAMS

C. DONALDSON

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GQF 3757 1 FIELD 12A,13M,20H,20D

GENERAL ELECTRIC CORP, PHILADELPHIA, PENNSYLVANIA

HYPERSONIC RAREFIED PLASMA FLOWS

S. M. SCALA

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WALL TURBULENCE

T. J. HANRATTY

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GQF 3775 1 FIELD 5A,20L, 7B

OREGON STATE UNIV, GRADUATE SCHOOL, PHYSICS, OREGON

NUCLEAR E2 SPIN TRANSITIONS IN TETRAHEDRAL LATTICES

W. L. PIERCE

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GQF 3786 1 FIELD 7C, 7D,20M,20J

UNIV OF SUSSEX, UNITED KINGDOM

MEASUREMENTS ON THE ABSORBED PHASES OF HE3 AND HE4 AT LOW TEMPERATURES

D. F. BREWER

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GENL. DYN., INC., FT, TEXAS

MULTI-FLUID ANALYSIS OF WAVE PROPAGATION IN A HYDROMAGNETIC WAVEGUIDE

B. A. SODEK

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GQF 3826 FIELD 5A,20K

NORTHWESTERN UNIV, SCHOOL OF ENGINEERING, CIVIL ENGINEERING, ILLINOIS

INTERNATIONAL CONFERENCE ON DYNAMIC STABILITY OF STRUCTURES

G. HERRMANN

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GQF 3844 FIELD 20M,20L, 7B

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SEMICONDUCTING PHENOMENA IN PURE AND DOPED CUPROUS OXIDE

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GQF 3845 FIELD 20L

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LOCALIZED VIBRATIONAL MODES NEAR IMPERFECTIONS IN IONIC CRYSTALS

G. F. NARDELLI

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GQF 3917 FIELD 20D

MELLON INST OF INDUS, PENNSYLVANIA

FLOW PROPERTIES OF NON-NEUTONIAN FLUIDS

B. D. COLEMAN

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GQF 3947 FIELD 20M,12A, 9D

LAB. FOR ELEC., BOST, MASSACHUSETTS

ENTROPY CONCEPTS IN COMPLEX SYSTEMS

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GQF 3972 2 FIELD 12A,20H,20J

MASS INST OF TECHNOL, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

MATHEMATICAL THEORY OF ELEMENTARY PARTICLES

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GQF 3993 FIELD 20M, 5A,20F,20L

BRIGHAM YOUNG UNIV, GRADUATE SCHOOL, PHYSICS, UTAH

CYCLOTRON RESONANCE IN HIGH CONDUCTIVITY SEMICONDUCTORS

J. H. GARDNER

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GQF 3996 FIELD 5A,20L, 7B

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ELECTRON SPIN-PHONON INTERACTIONS IN METALS AND SEMICONDUCTORS

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GQF 3999 FIELD 5A,20L

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CRITICAL POINT PHENOMENA IN MAGNETISM

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GQF 4101 1 FIELD 20L, 7B

WESTINGHOUSE RES LAB, PENNSYLVANIA

GROWTH AND CHARACTERIZATION OF SINGLE CRYSTALS OF RARE EARTH COMPOUNDS

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GQF 4304 FIELD 20M,20L

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DISORDER IN PARAELECTRIC AND ANTIFERROELECTRIC PHASES OF FERROELECTRICS

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GQF 4312 FIELD 20M, 5A,20L, 7B

CARNEGIE INST TECHNOL, SCHOOL OF ENGINEERING, PHYSICS, PENNSYLVANIA

ELECTRONIC SPECIFIC HEAT OF NOBLE AND TRANSITION METAL ALLOYS

J. A. RAYNE

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BATTELLE MEMORIAL IN, OHIO

THEORY OF THE PEIERLS STRESS

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GQF 4317 FIELD 11G

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STRAIN ENERGY AND METASTABILITY OF THREE DIMENSIONAL DISLOCATIONS ARRAYS

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GQF 4328 FIELD 20D

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AN EXPERIMENTAL DETERMINATION OF THE TRANSITION TO TURBULENCE USING THE DOUBLE LAYER

K. MILLSAPS

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GQF 4338 FIELD 20F,20L,20J

AUTONETICS, ANAHEIM, CALIFORNIA

THIN FILM OPTICAL TRANSMISSION LINE

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ELECTRIC AND THERMAL TRANSPORT PROCESSES OF A SOLID IN MAGNETIC FIELDS

M. R. ELSADEN

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BETA SPECTRUM OF NEUTRON DECAY IN COINCIDENCE WITH RECOIL PROTONS

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GENERAL RELATIVITY AND QUANTUM THEORY

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GQF 4362 FIELD 20J,20D, 5A,20L

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THEORETICAL STUDIES OF THE LOW-TEMPERATURE PROPERTIES OF LIQUID AND CRYSTALLINE HELIUM

L. H. NOSANOW

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GQF 4363 FIELD 20D,20L

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PRESSURE DEPENDENCE OF THE DIELECTRIC PROPERTIES OF LIQUIDS AND SOLIDS

B. K. SCAIFE

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GQF 4377 FIELD 20I,20L, 7B

MAGNETOPLASMA EFFECTS IN SOLIDS

J. BOK

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DARTMOUTH COLLEGE, GRADUATE SCHOOL, PHYSICS, NEW HAMPSHIRE

HYDROMAGNETIC WAVE-PARTICLE BEAM INTERACTIONS

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SOFT X-RAY PHYSICS BETWEEN 5A AND 150A

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MITHRAS INC CAMBRIDGE, MASSACHUSETTS

TURBULENT WAKE COOLING WITH BASE INJECTION

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NEW YORK UNIVERSITY, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, NEW YORK

VARIATIONAL METHODS IN NONLINEAR SHELL PROBLEMS

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STUDY RESPONSE OF A LARGE SYSTEM TO A TIME-DEPENDENT EXTERNAL FIELD

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GQF 4402 FIELD 20I

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ELECTRON BEAM-PLASMA INTERACTION

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BINDING AND MOBILITY OF METAL ATOMS ON CRYSTAL SURFACES

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GENERAL RELATIVITY

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SYMPOSIUM ON FLUID MECHANICS AND HEAT TRANSFER UNDER LOW GRAVITY CONDITIONS

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DYNAMICS OF NON-NEWTONIAN FLUIDS NEAR COMPLIANT SURFACES

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IMPULSIVE MOTION OF ELASTIC STRUCTURES CAUSED BY MOVING LOADS

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EFFECTS OF PLASTICITY ON THE BUCKLING AND POSTBUCKLING OF CYLINDRICAL SHELLS

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GORDON RESEARCH CONFERENCE ON PHOTO NUCLEAR REACTIONS

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ATOM-ENVIRONMENT STUDY BY THE EXPANDED HAMILTONIAN

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MHD SHOCK WAVES IN A COLD-DISSIPATIVE 2 FLUIDPLASMA

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SYMPOSIUM ON QUANTUM FLUIDS

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GQF 5788 1 FIELD 7C, 7A,20M,20J

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SPECTRA FROM HOT COMPRESSED GASES

S. Y. CHEN

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GQF 6525 1 FIELD 5A,20I

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PLASMA DYNAMICS AND INTERACTIONS WITH HIGH FREQUENCY FIELDS

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GQF 6701 1 FIELD 20F,20I

AEROJET-GEN NUCLEONICS, SAN RAMON, CALIFORNIA

UNSTABLE OSCILLATIONS IN ENERGETIC ARCS

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GQF 6727 1 FIELD 11G,20F,20L

SOUTHERN ILLINOIS UNIV, GRADUATE SCHOOL, ILLINOIS

SINGLE CRYSTALS UNDER THERMAL GRADIENTS

J. L. AMOROS

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GQF 6731 1 FIELD 20D

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, MASSACHUSETTS

WAKE STUDIES USING MAGNETIC SUSPENSION

M. FINSTON

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GQF 6744 1 FIELD 11G,20L

UNIV OF TEXAS, AUSTIN, SCHOOL OF ENGINEERING, ENGINEERING MECHANICS, TEXAS

MECHANISM OF FATIGUE IN METALLIC CRYSTALS

M. A. WILKOV

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GQF 6758 1 FIELD 20M, 5A,20L, 7B

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SURFACE PROPERTIES BY SLOW ELECTRON DIFFRACTION

R. M. STERN

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GQF 6788 1 FIELD 5A,20L, 7B

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COLOR CENTERS IN SINGLE CRYSTALS OF THE ALKALINE EARTH OXIDES

E. F. SIECKMANN

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GQF 6834 1 FIELD 20D

UNIVERSITY OF OKLAHOMA, SCHOOL OF ENGINEERING, ENGINEERING, OKLAHOMA

A UNIFIED APPROACH TO TRANSPORT PHENOMENA BASED ON ENGINEERING THERMODYNAMICS

C. M. SLIEPCEVICH

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GQF 6838 1 FIELD 20I

INTERACTION OF PLASMA STREAMS WITH MAGNETIC FIELDS

J. M. SELLEN

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GQF 6845 1 FIELD 12A,20J,20I

RELAXATION TIMES OF A DILUTE PLASMA

R. S. ONG

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GQF 14143 FIELD 20L

UNIV OF TORONTO, GRADUATE SCHOOL, CANADA

INVESTIGATION OF HALL-CURRENT ACCELERATION

R. M. MEASURES

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GQF 19941 FIELD 11B

MELLON INST OF INDUS, PENNSYLVANIA

DEFECT STATES AND STRUCTURES OF OXIDE GLASSES

J. H. MACKEY

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GQF 20097 FIELD 20L,20D,20K

CASE INST OF TECHNOL, SCHOOL OF ENGINEERING, ENGINEERING, OHIO

TIME-DEPENDENT HYPERSONIC VISCOUS INTERACTIONS

E. RESHOTKO

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GQF 20137 FIELD 20F,20I,20A

UNIV OF CAL-L. A., GRADUATE SCHOOL, CALIFORNIA

JOINT EXPERIMENTAL AND THEORETICAL INVESTIGATIONS IN PLASMA PHYSICS

A. Y. WONG

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GQF 207070 2 FIELD 20D,10B

HYPERSONIC AEROTHERMODYNAMIC SIMULATION IN RAREFIED FLOWS

S. L. PETRIE

AF-33-657-11060
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GQF 207087 4 FIELD 20D

PRINCETON UNIVERSITY, SCHOOL OF ENGINEERING, AEROSPACE + MECH SCI, NEW JERSEY

HYPERSONIC FLOW RESEARCH

S. M. BOGDONOFF

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HYPERSONIC RAREFIED VISCOUS FLOW PHENOMENA NON-EQUILIBRIUM FLOW MAGNETOHYDRODYNAMICS AT EXTREMELY HIGH MACH NOS AND TEMPERATURES

H. GLICK

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GQF 207117 4 FIELD 20L,20D

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

EFFECTS OF FREE STREAM TURBULENCE + OSCILLATIONS ON HEAT TRANSFER AND SURFACE DRAG

J. KESTIN

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GQF 207121 3 FIELD 20M,20D,10B,20I

CORNELL AERONAUT. LA, NEW YORK

AN EVAPORATIVE FILM CALORIMETRIC ENTHALPY PROBE

S. A. STERBUTZEL

AF-33-615-02461
/65- /

DOD-AIR FORCE

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GQF 207129 3 FIELD 20I

DARTMOUTH COLLEGE, GRADUATE SCHOOL, NEW HAMPSHIRE

INTERACTIONS BETWEEN ELECTRIC ARC + GAS FLOWS IN THE ANODE SHEATH REGION

P. RUNSTADLER

AF-33-657-08179
/65- /

DOD-AIR FORCE

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GQF 207134 3 FIELD 20D,20K

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, MECHANICAL ENGINEERING, MICHIGAN

INFLUENCE OF SURFACE OSCILLATIONS ON BOUNDARY LAYER FLOWS

J. A. CLARK

AF-33-657-08368
/65- /

DOD-AIR FORCE

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GQF 207135 4 FIELD 20M,20I,20D, 7B

AVCO MFG CORP WILMIN, MASSACHUSETTS

RADIATION FROM ARC HEATED PLASMAS

J. MORRIS

AF-33-615-02976
/65- /

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GQF 207143 2 FIELD 20D

PRINCETON UNIVERSITY, SCHOOL OF ENGINEERING, AEROSPACE + MECH SCI, NEW JERSEY

LAMINAR MIXING AND HEAT TRANSFER OF AN IONIZED GAS AND A GASEOUS COOLANT

J. GREY

AF-33-657-09962
/65- /

DOD-AIR FORCE

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GQF 207149 1 FIELD 20D,20K

MIDWEST RES INST KAN, MISSOURI

EXPERIMENTS ON CIRCULAR CYLINDER PANEL FLUTTER

R. O. STEARMAN

AF-33-615-01740
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GQF 207157 3 FIELD 20D

ISR INST OF TECHNOLOGY, ISRAEL

THEORY FOR SUPERSONIC TWO DIMENSIONAL LAMINAR BASE TYPE FLOWS USING THE CROCCO LEES MIXING CONCEPTS

J. ROM

AF-61-052-00576
/65- /

DOD-AIR FORCE

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GQF 207158 1 FIELD 20F,20I, 7B

TECH HIGH SCH AACHEN, GERMANY

ANALYTICAL STUDIES OF ARC DISCHARGE PHENOMENA

I. W. FUCKS

AF-61-052-00805
/65- /

DOD-AIR FORCE

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GQF 207311 2 FIELD 5A,20J

NORTHEASTERN UNIV, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

ELEMENTARY PARTICLES AND RELATIVITY THEORY

R. L. ARNOWITT

AF-33-657-10161
/65- /

DOD-AIR FORCE

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GQF 207313 4 FIELD 12A,20H, 5A,20J

STEVENS INST OF TECH, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

PROBLEMS RELATING QUANTUM THEORY TO THE GENERAL THEORY OF RELATIVITY

R. SCHILLER

AF-33-657-11558
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DOD-AIR FORCE

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GQF 207320 3 FIELD 3C,12A, 8E,20H

UNIV OF HAMBURG, GERMANY

MATHEMATICAL PROBLEMS OF GENERAL RELATIVITY AND ELEMENTARY PARTICLES

P. JORDAN

AF-61-052-00567
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DOD-AIR FORCE

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GQF 207334 1 FIELD 20L,20D

DYNAMIC SCIENCES CORP, SOUTH PASADENA, CALIFORNIA

ANALYTICAL STUDY OF PARTICLE-FLUID FLOWS IN EXPANDING CURVED DUCTS

M. GERSTEIN

AF-33-615-01040
/65- /

DOD-AIR FORCE

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GQF 207335 1 FIELD 20D

RSCH INVESTIGATION ON THE SEPARATION OF SOLID PARTICLES FROM A SWIRLING FLUID FLOW

J. D. LEE

AF-33-615-01063
/65- /

DOD-AIR FORCE

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GQF 207344 3 FIELD 7D, 7A,20M, 9C

UNIVERSITY OF MICHIGAN, SCHOOL OF ENGINEERING, AERONAUT + ASTRONAUT, MICHIGAN

RESEARCH STUDY OF CONDENSATION PHENOMENA RELATED TO VAPORS IN EXPANDING GASES

P. M. SHERMAN

AF-33-615-02307
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DOD-AIR FORCE

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GQF 207357 4 FIELD 20M,20J, 5A,20F

OPTICAL PROPERTIES OF SEMICONDUCTING SINGLE CRYSTALS

W. R. RAMBAUSKE

AF-33-615-01257
/65- /

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GQF 207362 3 FIELD 20M,20F,20L, 7B

CRYOPHYSICAL RESEARCH ON CDS

J. G. DAUNT

AF-33-657-08973
/65- /

DOD-AIR FORCE

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GQF 207363 3 FIELD 9+, 9A,20J,20L

BROWN UNIVERSITY, GRADUATE SCHOOL, ENGINEERING, RHODE ISLAND

STUDIES OF RADIATION EFFECTS IN SEMICONDUCTORS

J. J. LOFERSKI

AF-33-615-02310
/65- /

DOD-AIR FORCE

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GQF 207368 6 FIELD 5A,20L

UNIV OF WISCONSIN, GRADUATE SCHOOL, PHYSICS, WISCONSIN

ENERGY LEVELS IN SEMICONDUCTOR MATERIALS THRU CYCLOTRON RESONANCE

R. N. DEXTER

AF-33-657-11515
/65- /

DOD-AIR FORCE

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GQF 207377 5 FIELD 7B

ILLINOIS INST OF TECH, GRADUATE SCHOOL, ILLINOIS

PHASE EQUILIBRIA STUDIES IN THE ZRO-2-SC203 SYSTEM

R. F. DOMAGALA

AF-33-615-01486
/65- /

DOD-AIR FORCE

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GQF 207386 5 FIELD 20J

UNIV OF UPPSALA, SWEDEN

QUANTUM THEORY OF MANY-PARTICLE SYSTEMS

P. O. LOWDIN

AF-61-052-00701
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GQF 207387 2 FIELD 20D,20I

AVCO MFG CORP WILMIN, MASSACHUSETTS

INVESTIGATION OF GAS ACCELERATION THROUGH INTERACTION OF ELECTRIC DISCHARGES WITH PRE-IONIZED GASES AND MAGNETIC FIELDS

A. MALLIARIS

AF-33-657-11310
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DOD-AIR FORCE

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GQF 207409 FIELD 5A,20F,20I

UNIV OF SOUTHERN CALIF, GRADUATE SCHOOL, PHYSICS, CALIFORNIA

ARC PLASMA DIAGNOSTICS WITH VACUUM ULTRAVIOLET RADIATION

G. L. WEISSLER

AF-33-615-02395
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GQF.207410 FIELD 20I

EXPLORATORY FUNCTIONS FOR THE DETERMINATION OF THE PARTICLE DISTRIBUTION FUNCTIONS IN PLASMAS

I. P. SHKAROFSKY

AF-33-615-02196
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DOD-AIR FORCE

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GQF 207413 FIELD 20D

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, MICHIGAN

EFFECTS OF WIND TUNNEL TURBULENCE ON BOUNDARY-LAYER TRANSITION AT MACH NUMBER 8.0

J. L. AMICK

AF-33-615-/2407
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GQF 207418 2 FIELD 20D,10B

VON KARMAN INST FL DYN, BELGIUM

INVESTIGATION ON BLUNT TRAILING EDGE BLADINGS FOR USE IN SUPERSONIC COMPRESSORS

J. CHAUVIN

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GQF 207423 FIELD 7D,14E,20M,11G

OHIO STATE UNIVERSITY, GRADUATE SCHOOL, OHIO

LOW TEMPERATURE THERMAL EXPANSION OF WURTZITE-PHASES OF II B-VI B COMPOUNDS

R. R. REEBER

AF-33-615-02270
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GQF 207429 FIELD 13+, 9C, 9+,20L

CURTISS WRIGHT CORP, NEW JERSEY

RESEARCH STUDY OF ELECTROGASDYNAMIC ENERGY CONVERSION

B. KAHN

AF-33-615-02731
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DOD-AIR FORCE

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GQF 207439 FIELD 20D,10B

NORTHERN RES ENGR CORP, CAMBRIDGE, MASSACHUSETTS

BASIC RESEARCH ON THE INVESTIGATION OF A TWO-COMPONENT HEAT TRANSFER

H. W. BILGER

AF-33-615-02340
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GQF 207477 FIELD 20D,20K, 5A

PRINCETON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW JERSEY

HIGH SPEED GAS DYNAMICS

S. M. BOGDONOFF

AF-49-638-01271
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GQF 207478 FIELD 20D,20L, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ELECTRON BEAM INTERACTIONS ON SURFACES

T. HAAS

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DOD-AIR FORCE

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GQF 207482 FIELD 7A, 7D,20M,12A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

INVESTIGATION OF ENERGY TRANSPORT IN A REACTING GAS

K. SCHELLER

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DOD-AIR FORCE

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GQF 207488 FIELD 20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

HEAT TRANSFER IN NATURAL CONVECTION

M. SCHERBERG

/65- /

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GQF 207493 FIELD 13+, 9+, 9C, 9A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ARC RETROGRADE MOTION

H. SCHRADE

/65- /

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GQF 207494 FIELD 12A,13M,20M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ELECTRIC ARC COLUMN IN TRANSVERSE MAGNETIC AND FLOW FIELDS

A. ROMAN

/65- /

DOD-AIR FORCE

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GQF 207503 FIELD 12A,13M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RAREFIED GAS STUDIES

R. KORKEGI

/65- /

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GQF 207504 FIELD 12A,13M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

VISCOUS FLOW INTERACTION STUDIES

R. KORKEGI

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GQF 207505 FIELD 12A,13M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

SEPARATED FLOW STUDIES

A. HAVKEY

/65- /

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GQF 207510 FIELD 7D, 7A,20M,11B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

THERMODYNAMIC STUDIES OF METAL AND OXIDE SYSTEMS

L. BIDWELL

/65- /

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GQF 207512 FIELD 20L

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

X-RAY DIFFRACTION STUDIES

H. GARRETT

/65- /

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GQF 207513 FIELD 20M,20L, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

ELECTRICAL AND MECHANICAL PROPERTIES OF SELECTED OXIDES AND HALIDES

N. TALLAN

/65- /

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GQF 207517 FIELD 7D,12A,20L,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

REACTIN GAS FLOW TABLES

R. SHANAHAN

/65- /

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GQF 207522 FIELD 7C, 7D,20D, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

SEPARATE AIR COMPONENT HEATING STUDY

N. SCAGGS

/65- /

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GQF 207523 FIELD 13+, 9+, 9C,10B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

PEBBLE BED ARC HEATING TECHNIQUES

R. PRETE

/65- /

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GQF 207524 FIELD 12A,13M,20L,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

WALL-INJECTION NOZZLE STUDIES

J. STEURER

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GQF 207527 FIELD 20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH ON SUPERPRESSURE TECHNIQUES

A. WENNERSTROM

/65- /

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GQF 207529 FIELD 20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

TEMPERATURE MEASURING TECHNIQUE FOR HYPERSONIC FLOWS

R. DUNN

/65- /

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GQF 207530 FIELD 20D,20J,20F

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDY OF SCHLIEREN AND INTERFEROMETER TECHNIQUES FOR FLOW VISUALIZATION

A. WENNERSTROM

/65- /

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GQF 207531 FIELD 20M,20D,10B, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

SUPERSATURATION IN HYPERSONIC FLOWS

F. DAUM

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GQF 207541 FIELD 12A,13M,20D

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDY OF TURBULENCE AND ITS ONSET

J. LEE

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GQF 207553 FIELD 20J,20F,20I, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

LOW DENSITY PLASMA DYNAMICS

A. GAKSCADDEN

/65- /

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GQF 207559 FIELD 12A,20H,18A

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

PION PHYSICS

C. POIRIER

/65- /

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GQF 207564 FIELD 12A,20H,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

CONSTRAINT CONDITIONS IN THE QUANTIZATION OF FIELDS

D. SHANKLAND

/65- /

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GQF 207566 FIELD 12A,20H,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

STUDY OF THE THEORY OF GRAVITATIONAL RADIATION

J. WINICOUR

/65- /

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GQF 207567 FIELD 12A,20H,20J

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

RESEARCH IN GAUGE-TYPE FIELD THEORIES

S. FICKLER

/65- /

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GQF 207571 FIELD 20M,11G,20L, 7B

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

REACTION OF SEMICONDUCTURS TO ELECTRON BOMBARDMENT

B. KULP

/65- /

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GQF 258005 2 FIELD 4A, 8+, 9+,12A

BOSTON COLLEGE, GRADUATE SCHOOL, MATHEMATICS, MASSACHUSETTS

THEORETICAL RESEARCH ON DUCT PROPAGATION OF RADIO WAVES CAUSED BY REFRACTIVE INDEX ANOMALIES

R. M. RING

AF-19-628-02772
/65- /

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GQF 258070 2 FIELD 12A,20H, 5A,20J

BOSTON UNIVERSITY, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

INVESTIGATION OF INVARIENCE PROPERTIES OF QUANTUM ELECTRODYNAMICS FROM A TOPOLOGICAL POINT OF VIEW

M. SACHS

AF-19-628-02816
/65- /

DOD-AIR FORCE

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GQF 258414 1 FIELD 20J, 5A,20D,20L

BOSTON COLLEGE, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

INVEST PHYSICAL MECHANISMS ASSOCIATED WITH GROWTH + PERFECTION OF SINGLE CRYSTALS OF ELECTRONIC MATS

J. H. CHEN

AF-19-628-04041
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DOD-AIR FORCE

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GQF 258416 4 FIELD 9+,20J,20I,20L

DESIGN + DEV OF A GAS PLASMA HEAT SOURCE TO REPLACE OXY-HYDROGEN FLAME NOW USED IN VERNEUIL FURNACE

W. H. BAUER

AF-19-604-08495
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GQF 258442 1 FIELD 20F,20L

LAB OF PLASMA PHYSICS, FRANCE

STUDY NATURE + ROLE OF IMPURITIES + IMPERFECTIONS ON SEMICON PROPS BY OPTICAL + MAGNESONANCE SPECTRO

M. BALKANSKI

AF-61-052-00789
/65- /

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GQF 258444 1 FIELD 20J, 5A,20L

NORTHEASTERN UNIV, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

THEORET INVEST OF THE PHYSICS UNDERLYING THE PHENOMENON OF MAGNETIC ANISOTROPY

W. HAUSER

AF-19-628-03811
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GQF 258454 3 FIELD 20M,11B, 5A,20F

MASS INST OF TECHNOL, GRADUATE SCHOOL, PHYSICS, MASSACHUSETTS

INVESTIGATION ON THE GROWTH + PROPERTIES SUCH AS HARDNESS ELEC OPTICAL OF HI-TEMP SINGLE CRYSTALS

A. SMAKULA

AF-19-628-00395
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GQF 258542 1 FIELD 12A,20H,20F

NEW YORK UNIVERSITY, GRADUATE SCHOOL, MATHEMATICS, NEW YORK

THEORETICAL RESEARCH ON CLASSICAL ELECTROMAGNETIC THEORY + CONCEPTS

M. KLINE

AF-19-628-03868
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GQF 258548 2 FIELD 9+, 9A, 5A,20F

UNIVERSITY OF MICHIGAN, GRADUATE SCHOOL, PHYSICS, MICHIGAN

THEORETICAL + EXPERIMENTAL STUDY OF RADAR REFLECTION + SCATTERING AND REFLECTION REDUCTION TECHNIQUES

R. E. HIATT

AF-19-628-02374
/65- /

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GQF 258557 1 FIELD 5A,20L

THEORETICAL + EXPERIMENTAL RSCH ON FERROELECTRIC + FERROMAGNETIC PHENOMENA IN SOLIDS

R. V. JONES

AF-19-628-03874
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GQF 258684 2 FIELD 3A, 5A,20F,20I

YESHIVA UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

STUDY OF RELAVISTIC PLASMAS AND MEASUREMENT OF THEIR CHARACTERISTICS

D. FINKELSTEIN

AF-19-628-02399
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GQF 258770 3 FIELD 20J, 5A,20F,20I

UNIVERSITY OF MARYLAND, GRADUATE SCHOOL, PHYSICS, MARYLAND

EXPERIMENTAL INVESTIGATION OF MAGNETIC SHOCK WAVES

H. GRIEM

AF-19-628-00269
/65- /

DOD-AIR FORCE

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GQF 258955 FIELD 12A,20H,20F,20J

LOCKHEED AIRCRAFT CORP, SUNNYVALE, CALIFORNIA

THEORETICAL + EXPERIMENTAL STUDIES OF THE APPLICATION OF GENERAL SPHERICAL FUNCTIONS TO SCATTERING

W. H. WATSON

AF-19-628-05094
/65- /

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GQF 258964 FIELD 20F,20I

THEORETICAL AND EXPERIMENTAL STUDIES OF PLASMA INTERACTIONS WITH INTENSE RF ENERGY

J. I. KING

AF-19-628-05095
/65- /

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GQF 259048 FIELD 20M, 9+, 9A,20F

WESTINGHOUSE RES LAB, PENNSYLVANIA

DEVELOP FABRICATION TECHNI LOW PHONON LOSS

J. DEKLERK

AF-19-628-04372
/65- /

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GQF 259053 FIELD 9+, 9A,20F,20L

SPERRY RAND RES CENTER, SUDBURY, MASSACHUSETTS

RESEARCH ON THE GENERATION + AMPLIFICATION OF SPIN WAVES + DELAY AT MICROWAVE FREQUENCIES

R. W. DAMON

AF-19-628-04764
/65- /

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GQF 259057 FIELD 9+, 9A

THEORETICAL + EXPERIMENTAL STUDIES OF RADIATION AND BEAM SCANNING CHARACTERISTICS OF PLASMA COLUMNS

I. KAUFMAN

AF-19-628-05041
/65- /

DOD-AIR FORCE

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GQF 259076 2 FIELD 9+,12A, 9C,20H

THEORETICAL STUDIES ON THE INTERACTION OF EM WAVES WITH IONIZED FLOW FIELDS

A. S. THOMAS

AF-19-628-02358
/65- /

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GQF 259095 1 FIELD 9+,20F

OHIO STATE UNIVERSITY, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, OHIO

RESEARCH INTO NEW METHODS OF ANALYSIS OF SCATTERING OF EM ENERGY BY HIGHLY CONDUCTING BODIES

E. M. KENNAUGH

AF-19-628-04002
/65- /

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GQF 259114 FIELD 20D,20F,20I, 7B

GENERAL ELECTRIC CORP, PHILADELPHIA, PENNSYLVANIA

RESEARCH STUDIES ON THE EFFECTS OF MOLECULAR CONTAMINANTS ON RF INDUCED PLASMA SHIELD PROPAGATION

G. W. BETHKE

AF-19-628-04382
/65- /

DOD-AIR FORCE

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GQF 259119 FIELD 9+, 9A,20F

UNIV OF LEEDS, UNITED KINGDOM

THEORETICAL + EXPERIMENTAL STUDIES ON THE PROPGATION OF EM WAVES IN CYLINDERS WITH VARIOUS MEDIA

P. CLARRICOAT

AF-61-052-00783
/65- /

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GQF 259394 FIELD 20F,20L

MONSANTO CHEMICAL CO, SANTO CHEMICAL CO EVER, MASSACHUSETTS

RESEARCH ON PURITY-PROPERTY RELATIONSHIP IN ORGANIC SEMICONDUCTION

J. S. DRISCOLL

AF-19-628-04348
/65- /

DOD-AIR FORCE

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GQF 259407 1 FIELD 20F,20L

U S TESTING CO INC, NEW JERSEY

RESEARCH ON THE OPTICAL AND MAGNETIC PROPERTIES OF ORGANIC CRYSTALS

D. P. CRAIG

AF-61-052-00719
/65- /

DOD-AIR FORCE

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GQF 259440 FIELD 20F

STUDIES IN FAR IR REGION ON ATMOSPHERIC GASES OPTICAL PROPS OF SEL CRYSTALS + ON SOURCES OF RADIATION

. NONE

AF-19-628-05037
/65- /

DOD-AIR FORCE

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GQF 259560 FIELD 20F,20L

UNIV OF READING, UNITED KINGDOM

DESIGN AND FABRICATION OF NARROW BAND FILTERS AND STUDY OF PROPERTIES OF FILTER MATERIALS ON IR

S. D. SMITH

AF-61-052-00833
/65- /

DOD-AIR FORCE

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GQF 259609 FIELD 7D,20J,20F, 7B

WENTWORTH INST., BOS, MASSACHUSETTS

RSCH OF ELECTRONIC STRUCTURE OF AT MOS GAS MOLECULES BY OPTICAL SPECTROGRAPHIC METHODS

M. J. DAVIN

AF-19-628-04982
/65- /

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GQF 259858 FIELD 20J,20F,20L, 7B

GENERAL ELECTRIC CO, SYRACUSE, NEW YORK

THEOR + EXPER EFFORT TO UNCOVER + EXPLOIT UNUSUAL ELEC MECHANICAL + OPTICAL PHENOMENON IN SOLIDS

R. N. HALL

AF-19-628-04976
/65- /

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GQF 259875 FIELD 9+, 9A,20L

STUDY OF PHENOM OF HOT ELECTRON INJECTION IN METAL SEMICONDUCTORS AND DEVELOPMENT + FABRICATION THIN METAL-BASE TRIODE

M. M. ATALLA

AF-19-628-04758
/65- /

DOD-AIR FORCE

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GQF 259876 FIELD 9+, 9A,12A,20H

PARKE MATH. LAB., CA, MASSACHUSETTS

THEORET + EXPER EFFORT ON CRYSTALLINE FIELDS VIA GAMMA-RAY ABSORPTION + ON MATH DEVICE CONCEPTS

N. G. PARKE

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DOD-AIR FORCE

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GQF 259888 FIELD 20F

UNIVERSITY OF VIRGINIA, SCHOOL OF ENGINEERING, AEROSPACE ENGINEERING, VIRGINIA

THEORETICAL + EXPERIMENTAL STUDIES OF PROPAGATION THRU VARIABLE MEDIA AS WELL AS UNIFORM MEDIA

A. R. KUHLTHAU

AF-19-628-05077
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DOD-AIR FORCE

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GQF 259892 2 FIELD 20M,10B,20D,20L

BAROGENICS INC N Y, NEW YORK

DESIGN + DEVELOP A HI-PRESSURE AUTOCLAVE FOR USE IN BUILDING A HI TEMP CRYSTAL GROWING FURNACE

. NONE

AF-19-628-02746
/65- /

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GQF 259911 1 FIELD 7A, 7D,20J,20F

STANFORD RESEARCH INST, MENLO PARK, CALIFORNIA

EFFORT ON GROWTH + CHARACTERIZATION OF LARGE SIC SINGLE XTALS + EFFECT OF DIFF DOPANTS ON ELEC PROPERTIES

. NONE

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GQF 259927 FIELD 4A,20I

THEOR AND EXPER STUDIES OF MHD PROPAGATION AND COLLISION EFFECTS OF NEUTRAL PARTICLES

S. L. KAHALAS

AF-19-628-05133
/65- /

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GQF 259930 FIELD 9+, 9A,20L, 7B

MOTOROLA INC, PHOENIX, ARIZONA

DET OPTIMUM PHYSICAL PARAMETERS FOR EPITAXIAL GROWTH OF SILICON CARBIDE FILMS ON SILICON SUBSTRATE

. NONE

AF-19-628-04802
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****

GQF 260406 FIELD 11G,12A,20H,20L

THEORET STUDY VIA COMPUTER TECHS FOR DET NATURE + NUMBER OF RADIATION INDUCED DAMAGE IN METALS

A. SOSIN

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GQF 260411 FIELD 20M,20F,20L

WENTWORTH INST., BOS, MASSACHUSETTS

TECHS FOR + PREPARATION + ANALYSIS OF PHYSICAL + CHEM PROP OF HI TEM SEMICONDUCTOR + OPTICAL MATERIALS

M. J. DAVIN

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GQF 260419 FIELD 5A,20F,20J

YESHIVA UNIVERSITY, GRADUATE SCHOOL, PHYSICS, NEW YORK

THEORET EFFORT ON PHYSICAL INTERPRETATION + RELATION TO EXPER OF MATH CONTEST OF QUANTUM THEORY

Y. AHARANOV

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GQF 260473 FIELD 4A, 8+, 9+

USDC, NATL BUR STAN, BOULDER, COLORADO

STUDY TO PREDICT EFFECTS OF ATMOSPHERIC TURBULENCE EFFECTS ON 35GCS SIGNALS FROM 9 + 19GCS PHASING

M. C. THOMPSON

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GQF 284605 2 FIELD 11B,20D,20L

NATL CASH REGISTER CO, OHIO

EFFECTS OF TRAPPED SPACE CHARGE ON ELECTRON TRANSPORT PROPERTIES OF THIN FILM INSULATORS

F. G. ULLMAN

AF-33-657-10459
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GQF 284606 3 FIELD 11B,11C,13H,11F

GENERAL DYNAMICS CORP, ROCHESTER, NEW YORK

THIN FILM MEASUREMENT TECHNIQUES

C. E. DRUMHELLER

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NUCLEATION AND GROWTH OF THIN FILMS

E. KRIKORIAN

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GQF 284692 4 FIELD 11F,11G

MIDWEST RES INST KAN, MISSOURI

MECHANISMS OF FATIGUE

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GQF 284702 2 FIELD 20M,11F,11G,20D

LITTON SYSTEMS INC, ST PAUL, MINNESOTA

SURFACE EFFECTS OF SOLIDS

E. R. PODNIEKS

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GQF 284705 3 FIELD 11D,11F,11G

MASS INST OF TECHNOL, SCHOOL OF ENGINEERING, METALLURGY, MASSACHUSETTS

MICRO X-RAY DIFFRACTION AND SCANNING ELECTRON MICROSCOPY OF FILAMENTARY GROWTH

R. E. OGILVIE

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GQF 284742 4 FIELD 9+, 9A,12A, 9C

MEASUREMENT OF LOCAL SPECTRAL INTENSITIES IN CASE OF A NONUNIFORM LIGHT SOURCE OF RADIAL SYMMETRY

W. L. HOLTGREVEN

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GQF 284776 2 FIELD 20J, 5A,20F,20I

UNIVERSITY OF OKLAHOMA, GRADUATE SCHOOL, PHYSICS, OKLAHOMA

OPTICAL PROPERTIES OF MATTER

R. G. FOWLER

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GQF 284872 2 FIELD 20F,20L, 7B

CATHOLIC UNIV OF AMER, SCHOOL OF ENGINEERING, ELECTRICAL ENGINEERING, DIST OF COLUMBIA

FERROELECTRIC SWITCHING PHENOMENA

C. F. PULVARI

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GQF 284902 FIELD 5A,20L

BROWN UNIVERSITY, GRADUATE SCHOOL, PHYSICS, RHODE ISLAND

LOW ENERGY DIFFRACTION STUDIES OF SPUTTERED SURFACES PART I

H. E. FARNSWORTH

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GQF 284963 FIELD 7C, 7D,20M,20J

ILLINOIS INST OF TECH, GRADUATE SCHOOL, ILLINOIS

INFRARED STUDY OF THE LATTICE VIBRATIONS OF ORGANIC MOLECULAR CRYSTALS

S. S. MITRA

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GQF 284974 FIELD 20L

HUGHES RESEARCH LABS, MALIBU, CALIFORNIA

CONDENSATION AND NUCLEATION PROCESSES OF SINGLE CRYSTAL THIN CRYSTAL THIN FILMS

R. KIKUCHI

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GQF 420541 FIELD 20D,20I,20L

INFLUENCE OF NON-ISOTROPIC ELECTRICAL CONDUCTIVITY ON FLOW DEVELOPMENT

W. T. SNYDER, M. K. NEWMAN

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GQF 420544 FIELD 20D,10B

GEN APPLIED SCIENCE, E LAB, WESTBURY, NEW YORK

CALIBRATION OF MACH 12 SQUARE NOZZLE

. ZAKKAY, J. RANLET

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GQF 475549 FIELD 12A,13M,20K

DENVER RES INST, DENVER, COLORADO

DYNAMICS OF THICK LAYERED ORTHOTROPIC SHELLS

R. SZILARD, J. P. MOORE, A. WEST

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BI-AXIALLY LOADED TAPERED COLUMNS

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GQQ 595159 4 FIELD 5A,20H,20L, 7B

UNIV OF NORTH CAROLINA, GRADUATE SCHOOL, PHYSICS, NORTH CAROLINA

FERMI SURFACE STUDIES

A. T. STEWART, D. ROCKMORE, P. VARLASHKIN

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DEFENSE-ADVANCED RES PROJECTS AGENCY

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21 PROPULSION AND FUELS

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GQF 6903 1 FIELD 7D,21B, 7A,20J

ASTROSYSTEMS INTERNATL, CALDWELL TOWNSHIP, NEW JERSEY

SPECTRA OF FLAMES AND COMBUSTION GASES

J. S. GORDON

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GQF 258269 1 FIELD 20L,10B

THIOKOL CHEM. CO., E. MARYLAND

SOLID PROPELLANT ROCKET MOTOR STUDIES

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ZUG 705 1 FIELD 21D, 7D, 7A, 8D

USDI, BUR MINES, SCHUYLKILL, PENNSYLVANIA

WASHABILITY CHARACTERISTICS OF PENNSYLVANIA ANTHRACITE

W. S. SANNER, R. D. WELKER

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INTERIOR-BUREAU OF MINES

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ZUG 706 1 FIELD 7D,21D, 7A

USDI, BUR MINES, SCHUYLKILL, PENNSYLVANIA

SAMPLING OF ANTHRACITE BREAKERS

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INTERIOR-BUREAU OF MINES

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ZUG 716 1 FIELD 19D,21B,21I

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

SAFETY OF HETEROGENEOUS MONOPROPELLANT SYSTEMS

C. M. MASON, D. R. FORSHEY

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ZUG 717 1 FIELD 19D,21B,21D, 7A

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

FIRE HAZARDS OF AMMONIUM NITRATE SYSTEMS

C. M. MASON, J. E. HAY, F. J. PERZAK

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INTERIOR-BUREAU OF MINES

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ZUG 726 1 FIELD 21B,21D,20M, 5A

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

INVESTIGATION OF FLAME PROPAGATION IN LAYERED GAS MIXTURES

H. E. PERLEE, A. STRASSER

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ZUG 729 1 FIELD 7D,21D

USDI, BUR MINES, MORGANTOWN, WEST VIRGINIA

FEASIBILITY OF CONTINUOUS ASH MEASUREMENT OF COAL

R. F. STEWART, W. L. FARRIOR
R. P. STEWART

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ZUG 731 1 FIELD 7C,21D, 7D, 7B

USDI, BUR MINES, PITTSBURGH, PENNSYLVANIA

ELECTROCHEMICAL TREATMENT OF COAL

I. WENDER, C. L. DELLEDONNE, R. E. MARKBY H. W. STERNBERG

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ZUG 747 1 FIELD 7D,21D, 7B

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NEUTRON MOISTURE METER FOR COAL

R. F. STEWART, A. W. HALL, R. P. STEWART

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INTERIOR-BUREAU OF MINES

22 SPACE TECHNOLOGY

••••••••••

GQF 259227 1 FIELD 22A,22D,17G, 9C

BALL BRO. RES. CORP., BOULDER, COLORADO

DESIGN FABRICATE AND TEST TEN EACH SOLAR POINTING CONTROLS AND RELATED TELEMETERING SYSTEMS

R. HATHAWAY

AF-19-628-04053
/65- /

DOD-AIR FORCE

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GQF 259241 1 FIELD 22D,12A,22C

REDUCTION OF DATA FROM ASPECT DETERMINING SYSTEMS

. NONE

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GQF 259607 1 FIELD 9+

MODIFICATION OF 2 CHANNEL SPECTRORADIOMETER FOR HORIZON MEAS FROM LOW LEVEL SATELLITES

D. LAVERY

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/65- /

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GQF 259633 1 FIELD 22B,22A,22D,22C

AMER SC + ENGR CO, MASSACHUSETTS

PRELIM ANALYSIS OF SATAR DATA

. NONE

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GQF 259638 1 FIELD 22B,22A,22C,17G

GENERAL DYNAMICS CORP, SAN DIEGO, CALIFORNIA

INTEGRATION OF A VERTISTAT SYSTEM INTO SATAR SATELLITE

. NONE

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GQF 259715 FIELD 22D, 9C, 9+, 9A

RESEARCH + DEVELOPMENT OF DATA ANALYSIS + DISPLAY GROUND STATION FOR SATELLITE-SATELLITE EXPERIMENT

C. BIBL

AF-19-628-04957
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GQF 475349 1 FIELD 22C,12A

INVESTIGATION OF SPACE PACKAGE ALIGHTMENT DYNAMIC LOAD DESIGN CRITERIA

K. C. YORK

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GQF 475412 1 FIELD 22C,17G,12A

INVESTIGATION OF THE ACQUISITION PROBLEM IN SATELLITE ATTITUDE CONTROL

A. E. SABKOFF, R. L. FARRENKOPF
A. W. FREW

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DOD-AIR FORCE

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GQF 475471 1 FIELD 22C,17G,12A

RE-ENTRY VEHICLE CONTROL SYSTEM DESIGN AND MECHANIZATION

D. SCHARMACK, W. WARD

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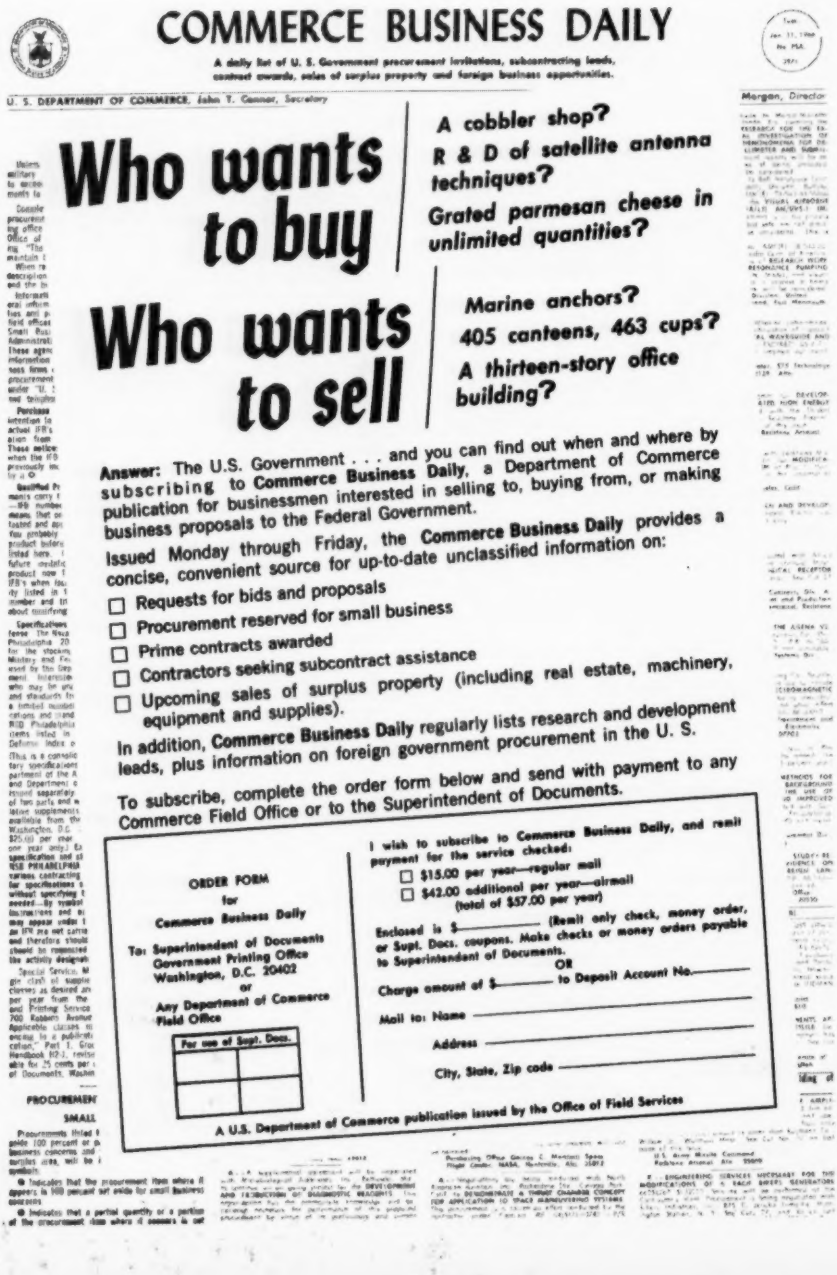

COMMERCE BUSINESS DAILY

A daily list of U. S. Government procurement invitations, subcontracting leads, contract awards, sales of surplus property and foreign business opportunities.

U. S. DEPARTMENT OF COMMERCE, John T. Connor, Secretary

Morgan, Director

Who wants to buy

A cobbler shop?
R & D of satellite antenna techniques?
Grated parmesan cheese in unlimited quantities?

Who wants to sell

Marine anchors?
405 canteens, 463 cups?
A thirteen-story office building?

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